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ABSTRACT

Five background papers were produced for the Research, Development and Dissemination System Committee of the National Educational Research Policy and Priorities Board in preparation for the proposed reauthorization of the Department of Education's Office of Educational Research and Improvement. The first paper, "Shaping the Future of Educational Research, Development, and Communication," describes and assesses the current system of educational research and development. The second paper, "The Educational Research, Development, and Dissemination System: An Analytic Mapping," explores the characteristics of the educational research and development system and the issues involving it. The third paper, "The Needs, Demand for, and Supply of Educational Research, Development, and Dissemination," provides a more detailed analysis of the nature of the research, development, and dissemination (RD&D) work required and demanded versus what is actually delivered. The fourth paper, "Comparison of Selected Federal RD&D Styles," considers alternative styles for the conduct of federal RD&D, focusing on the cognitive science program of the Office of Naval Research and the learning disabilities and reading program of the National Institute of Child Health and Human Development. The final paper, "A Review of the Federal Role and the Department of Education Structure," summarizes the federal role in research, specifically in educational research, and the structure for fulfilling the research role in the U.S. Department of Education. (Contains 11 tables, 1 chart, 3 figures, and 47 references.) (SLD)

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Table of Contents

1. Shaping the Future of Educational Research, Development, and Communication

2. The Educational Research, Development, and Dissemination System: An Analytic Mapping

3. The Needs, Demand for, and Supply of Educational Research, Development, and Dissemination

4. Comparison of Selected Federal RD&D Styles

5. A Review of the Federal Role and the Department of Education Structure

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SHAPING THE FUTURE OF EDUCATIONAL RESEARCH, DEVELOPMENT, AND COMMUNICATION

Working Paper Presented to

The National Educational Research Policy and Priorities Board

Papers Prepared Under Contract
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INTRODUCTION

The long-standing national goal for a well-educated citizenry faces new, more challenging demands for the 21st century just ahead. Those demands are led by the increase in the knowledge and skills required for a larger share of our working population by job markets. Those demands are made clear by continuing stories in our newspapers and other media of difficulties employers face in finding enough well-qualified and motivated workers to fill available jobs, which results in sending work abroad or diminishing national economic performance. These media reminders are underscored by disturbing academic analyses which point to the falling real income of high school graduates and the inability of almost half of those graduates to score sufficiently well on standard exams in reading and math to gain employment in a modern automobile plant.[*]

The differences in earnings between high school and college graduates continue to grow, but only in part because job content requires college level courses. The needed reading, math, computer and problem solving knowledge and skills can be and are taught and learned in elementary and secondary curricula; or at most, can be gained with one to two years of additional instruction for many jobs with good economic futures. Employers are also interested in potential employees with the so-called "soft" skills of teamwork and communication, all skills that can be taught in the elementary and secondary system. Employer demand for college education is, unfortunately, explained in part by the perceived limitations of the elementary and secondary system in producing an adequate knowledge and skill base for the workplace; and it is further fueled by parental ambitions for their children.

The growing demand for a stronger level of knowledge and skill goes beyond the demands of employment. To function in any role in the 21st century society, individuals will need to be able to read, figure and solve problems on their own at higher levels than before to conduct the ordinary, but increasingly complex functions of life and participate in the activities in their neighborhoods and the world at large. These growing demands call on all institutions and individuals, and perhaps our educational system most of all, to raise the level of educational performance to meet the challenge.

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[*] R. J. Murnane and F. Levy, *Teaching the New Basic Skills*

The challenge posed by "raising the bar" of acceptable educational performance standards and outcomes is paralleled by two important contextual trends, which add to the difficulty. The first of these is the rapid increase in the number of students "at risk" in school districts that are least able to marshal the human and financial resources to meet these growing demands. The demographic and geographic characteristics of the projected growth in the youth population over the next 30 years suggest that virtually all of it will be concentrated in these "at risk" areas. But one should not suppose that the challenge is confined to "at risk" kids in deteriorated urban school systems. As the recent Third International Mathematics and Science Study (TIMSS) makes clear, deficiencies in math skills and knowledge extend to all students at all levels of relative proficiency, including well-financed districts with mostly white students.

A second important contextual trend adding to the challenge of an effective educational response is the accelerating onrush of information technology. Already reaching into the lives of students, the new technologies are increasingly shaping formal education, for better or worse, and reemphasizing disparities between the "haves" and "have-nots." This challenge is not just about computer hardware and limited resources, vital as these factors are; it is also about the critical need to plan and integrate new technology into teaching and curricula, so as to expand and extend student learning.

These interacting challenges and issues represent a problem of immense national significance. The national educational enterprise in its many forms is widely and correctly understood to be a central provider of the knowledge, skills and perspective necessary to the success of our economy and the well being of our society. It is also part of the ethos that binds us together as a community and to bridge our many differences. The meeting of the new challenges requires more than good will, energy and resources. It also requires putting our knowledge to work and expanding our knowledge to meet the challenges posed by important trends. Trying to implement our hopes, our goals, or worse, our slogans without careful research, testing and development is likely to increase our frustrations without improving our performance.

Careful research, development and effective communication of findings have led to important contributions to sound educational practice. Examples of such contributions include:

- the growth and utilization of cognitive science, particularly as applied to reading;
- the improved understanding of the potential and limitations of measurement, assessment and testing;
- a better understanding of the organization of learning experiences;
- the necessary alignment of objectives, curriculum, teacher training and assessment for effective education policy and performance;
- and the importance of self-assessment to the achievement of comprehensive school reform.

The less cheerful news is how much we need to learn, particularly about the core processes of instruction and learning. These are the problems which parents, students and teachers want solved. The circumstances we face in the decades ahead require wise and substantially larger investments in our knowledge base to keep pace with a rapidly changing future and assure improved educational outcomes.

The National Educational Research Policy and Priorities Board (the "Board") has among its important responsibilities assigned by the Congress the identification of the needs and opportunities for educational research and development on a national basis. The Board considers the challenges identified above to constitute issues of crucial importance. Furthermore, the Board believes that research and development can make an important contribution in framing solutions to these problems. For that reason, the Board has undertaken an assessment of the current educational research, development and dissemination system, developed a vision of what it should be, and described a strategy of how that vision can be made a reality. In this work, it has conducted several workshops, commissioned four background papers, and consulted with experts and stakeholders. It has made this assessment with an emphasis on candor and realism, because of its conviction about the importance of putting research and development to effective use. Now is an important time for some basic decision-making about the national education research and development effort.

This assessment is part of a larger set of activities, all designed to strengthen the national knowledge-building system. These include steps to define an acceptable peer review process and strengthen the methodological base and standards of evidence for research and development work. After an initial review of the research agenda, the Board has proceeded with this assessment and a parallel study being undertaken by the National Academy of Education (NAE) to define cutting-edge research opportunities and priorities. This body of work is designed to invigorate and strengthen educational research and development and its communication and use in education problem solving and improvement.

ASSESSMENT OF THE CURRENT SYSTEM

Prior to discussing our assessment, the current system of research, development and dissemination for education first needs basic description and definition. The Board's formal responsibilities include concern for national efforts, not just the undertakings of the Office of Educational Research and Improvement (OERI) and the U.S. Department of Education. This assessment is accordingly national in scope, though its special focus is on the Department and OERI.

The language historically used to describe knowledge building and knowledge transmission no longer works to convey precise meaning in the education field. *Basic* versus *applied* research and *research* versus *development* are terms which no longer reflect realities with clarity. The lines between applied research, technical assistance and dissemination blur when one is dealing with the practical problem solving and information needs of a comprehensive reform effort in a local school district. As we better understand the interactive nature of knowledge building and the important role of school communities in the process, the linear model from research to implementation no longer captures an ideal process. Yet this existing language is a vital bridge to a more refined understanding. It is important to note at the outset that the Board perceives research and development (R&D) as a continuum of activity from fundamental understanding of phenomena and behavior to applied research, to initial development efforts to substantial trials or demonstration of concepts and systems which hold promise based on research and initial development.

The meaning of the terminology employed is important to the assessment of the current system and even more important to the implications of that assessment. All R&D is not the same in purpose, scope and methodological approach. Fundamental research is generally aimed at understanding basic phenomenology or behavior about important topics or poorly understood problems, not necessarily explicitly connected in its content to application or practice. Applied research generally takes new research findings into applied settings to test their relevance and impact in small ways. The more promising results of such basic and applied research are then taken into increasingly larger settings. This should be done under sufficiently rigorous conditions to develop, demonstrate and assess outcomes with confidence before moving the concepts into general practice.

This model of the R&D process is one of long-standing and continued use in many public and private R&D organizations. It evolved in the physical sciences, and has, therefore, less automatic applicability in the fields of social and behavioral sciences, particularly in the distinctions between basic and applied research. Further, not all work can or should proceed mechanically in linear fashion. Nonetheless, the model has stood the test of time in many domains, and provides for educational R&D a lens through which one can usefully examine the characteristics and behavior of the system. Equally important, the system has provided a framework through which the research community can communicate and explain the value and results of its knowledge-building proposals and activities to the funders and the public. It is interesting to note that the U.S. Department of Defense structure for this continuum has not changed in any fundamental way since it was first established in the early 1960s.

Our topic also includes that part of the knowledge-building process, most often labeled dissemination, which facilitates and transforms what we know into what we do. Dissemination in its traditional use connotes passive sources of electronic or written information and techniques to make that information accessible to those who need and want it. Dissemination has evolved from a paper process to an electronic one as well, as increasing volumes of information and data—some of it unassessed—have flooded the information market. While still vital, passive dissemination is increasingly understood to be necessary but not sufficient for the highly diffuse and decentralized educational system, particularly when a state or school district is undertaking large scale and intense efforts, such as comprehensive reform. In such cases, more proactive processes are needed in addition to traditional dissemination, which include aspects of applied research and technical assistance. Further, many programs, including the special education program in the U.S. Department of Education, have incorporated the crucial role of the national media in penetrating the consciousness of professionals in the field as a simulator to seek more information about innovative practice.

The Board in no way wants to replace traditional dissemination, though continued analysis of its cost and effectiveness is appropriate. However, the Board believes that a more comprehensive approach needs to be undertaken and conveyed to pursue the effective transformation of what we know to what we do. It contains elements of both utilization and communication, but we have selected the term "communication" to convey this broader meaning.

Also as a matter of definition and description, some important aspects of a comprehensive approach to any credible knowledge-building process will receive less attention in this assessment, not because of their lack of.importance, but rather because of the need to concentrate on elements most in need of attention and improvement. The first of these components is the collection of valid national data. Their importance in education has grown more evident as the National Center for Education Statistics (NCES) has become better financed and continued to mature as a statistical agency. The growing body of regularly and specially collected data is a critical part of sound research and a continuing source of performance indicators. Although this report does not dwell on the NCES program, it is not from lack of recognition of its continuing importance to the overall system. NCES will need to be a full partner in the development of learning agendas, and in making choices among the many important issues which might benefit from new or better information.

A second component given modest attention is the existing national education dissemination system known as ERIC (Educational Resources Information Center). That system provides an important foundation for the traditional national dissemination system, much used by scholars and practitioners. ERIC has been, and will continue to be, an important actor in the broad knowledge communication job, which needs to be done. ERIC has been criticized for the absence of a quality screen on the material it contains, but the Board understands that Herculean task begins with the establishment of standards of evidence now being developed by the Assistant Secretary for OERI. Further, such screens will obviously be implemented gradually.

Finally, this assessment gives primary attention to elementary and secondary education (K-12) rather than to postsecondary or higher education. The federal investment in R&D in postsecondary or higher education is relatively small and split among offices and agencies. Much of the work is sponsored by foundations and the institutions themselves. Though small, the work is important; but it does focus on common and unique problems in a quite different context which would require special treatment in this assessment. Given the overwhelming urgency and importance of the K-12 educational R&D issues, the Board has chosen to focus there.

Educational RDC Spending

It is reasonable to start an assessment with a description of the scope and content of educational research, development and communication (RDC) activities and spending levels across the nation. That logical beginning is frustratingly impossible from any readily available data sources. There are small islands of information about isolated components of the total, but the identification of educational activities from other spending purposes, RDC activities from identifiable educational spending, and useful sub-categories of RDC activities are too often unavailable.

A background paper commissioned by the Board undertook to provide as much of a mapping or profile as the data permit, using estimation where no other sources exist. The total national educational spending on education totaled $530 billion (inclusive of elementary, secondary and postsecondary) in 1995, some 7.3% of our gross domestic product (GDP). This fraction of total GDP is significant, though not as large as health, which represents in the range of 13% of GDP. The amount spent on educational RDC is necessarily a guess. If one seeks to add up the educational RDC spending in the U.S. Department of Education and among foundations, using generous definitions and interpretations, one can reach annual totals in the range of $900 million to $1 billion. It is clear that other federal agencies—the U.S. Departments of Defense, Health and Human Services, and the National Science Foundation among them—spend significant sums not routinely classified as educational RDC. State and local governments and universities, from other than federal and foundation funds, spend more modest amounts as well on RDC. Taking these organizations into account, one might postulate that total educational RDC may approach $2 billion annually.

With a $2 billion annual expenditure level of educational RDC activities, the nation would be investing less than one half of one percent of the total enterprise in educational knowledge building, an amount the National Research Council (NRC) estimated was 30 times less than is spent in health R&D. Other kinds of activity of national importance will invest a far higher percentage of total resources in knowledge-building activities; thus by any comparative measure, the nation is significantly under-invested in educational R&D.

The weight of expert opinion confirms the comparative analysis. The reviews of educational knowledge-building of the early 1990s by the National Academy of Sciences (NAS) and the National Academy of Education (NAE), and the more recent review of technology to strengthen K-12 education in the United States by a panel of the President's Committee of Advisors on Science and Technology (PCAST), all found educational R&D insufficiently funded on a national basis. The most recent review recommended a $1.5 billion annual increase in educational R&D for K-12. Even such a large increase would still leave educational R&D well below average in knowledge-building spending relative to other fields.

The national spending on educational RDC reflects not only a smaller amount than warranted by the size and importance of educational activity, but also is distributed in a way that reflects little or no sense of strategy and priorities, resulting in a set of gaps and imbalances. These undesirable characteristics are, in part, caused and made more difficult to correct by organizational arrangements and processes within the broader national RDC system. Indeed, the term "system" may imply more rationality than the fragmentation of resources and the lack of intellectual focus warrant. Both the substance of the work undertaken in the system and the processes by which it is planned, conducted, and used have been included in this assessment.

The Strengths of the Current System

Assessments naturally tend to focus on improvements to be made and problems to be fixed, and this one will not be an exception. The Board regards the problems as serious and urgent. But the assessment would be remiss in not calling attention to the strengths and opportunities which are present, and the progress which has been or is being made.

The major asset on which to build improvements to the system is the very large, as yet unmet, demand for more knowledge and information useful in classrooms that would achieve more effective educational practice to meet changing and escalating educational goals in a changing demographic, social and technological context. Further, while financial support is nowhere near appropriate levels, some resources are available, and the case for more is strong if the understanding, justification and performance potential are persuasively argued. There is a very broad range of R&D, particularly applied work, now being undertaken from which to select and build.

Prior reviews of this subject by the NAS and NAE in the early 1990s had a variety of recommendations, some of which have been actively pursued. For example, the OERI research program had been urged to provide for more field-initiated work, and that guidance has been substantially implemented in the agendas of the centers and labs. In this regard, it is important to distinguish between: (1) the formal field-initiated research program which represents 20% of the research budget and solicits proposals directly from researchers, and (2) the amount of specific work that is proposed from the bottom-up rather than the top down. In the latter category, a very large percentage of the work of the research centers emanates from within the center in response to broad areas of interest. Further, the work of the regional laboratories is largely in response to field level demands. In this broader sense, a much higher percentage than 20% of specific research projects is instigated in the field among researchers.

Within the Department of Education, there is much to be learned from the separate special education R&D program of the Office of Special Education and Rehabilitative Services (OSERS). While not trouble free in its insularity, the program demonstrates the importance of infrastructure, particularly the user and beneficiary support structure that stimulates and sustains the program and helps shape its objectives. Special education, in its demand profile, stands in sharp contrast with most of the rest of education R&D. There are also likely to be important lessons in the current experimentation in special education to substitute a more inclusive planning process for sharply defined statutory resource allocation formulas.

Concerns about the research standards and other standards of evidence in educational R&D are being addressed, in the first instance by the Board, and for standards of evidence by the Assistant Secretary for OERI. Our review and the continued urging of the Congress reinforce the need for quality assurance through the use of peer review systems. The recent study of the National Institutes of Health (NIH) by the Institutes of Medicine and our background paper make clear that peer review is neither foolproof nor the only effective approach to quality assurance, but it is one of the best tools we have. It should be extensively used in selecting specific projects. But peer review systems are far from the only component of quality assurance and priority setting. There are also issues of standards of evidence and methodologies that need serious and continuing attention, as this assessment will later discuss.

The communication system has been improved through the use of technology for better access to RDC products for those who seek them out. Much remains to be done with respect to coverage, timeliness and quality screens, but the Department appears sensitive to the needs.

The recent major implementation of the Government Performance and Results Act (GPRA) of 1993 at the federal level, which mandates the development of strategic plans, performance measures and annual performance plans, is providing an environment for focusing longer range research, development and knowledge-building needs associated with strategic objectives and budget resources. It will be important to ensure that policymakers, researchers and consumers understand that all research in a sensible and sound program is not instantly convertible into practice and that time horizons must stretch over several years, or in some cases, abandoned. But this understanding can be built and does exist in areas such as health.

The Department is exploring the development of longer range learning agendas, and is including R&D support for its strategic objectives. These statutory processes can also be used to focus on RDC system objectives. The Congress is making substantial use of GPRA provisions, and the recent House Appropriation Committee Report on the Fiscal Year 1999 budget request from the Department of Education makes clear its intent to require more specific performance measures to support appropriation requests including for research, development and communication activities. It is encouraging that the Congress wants to increase the use of evidence in making decisions. It is also important to understand how new and developmental the performance measurement system is, and particularly, the limitations of existing methodologies to assess the impact of small federal financial contributions to large efforts to achieve broad educational improvement goals.

The Issues in the Present System

This section describes in summary form the major issues that the Board perceives in the existing RDC system, organized in terms of adequate resources, balance and linkage, and processes. The assets and developments described above are commendable. They are, however, insufficient to address both long-standing problems and the increasing need for better returns from the investments in the RDC system.

Adequate Resources. Those long-standing problems start with the insufficient aggregate resources in RDC, identified earlier, which in turn cause other problems. Too few resources have led to spreading available resources thinly over a large number of topics rather than concentrating on fewer issues. The thinly spread resources include funds, staffing and organizational units and institutions. This strategy is unworkable. Resources need to be applied to major problems and areas of greatest need. The long-standing problems also include the perception that educational research is based on ideology rather than "science," a view that gains currency in a resource-starved environment.

- The OERI institutes, created in 1992 to refocus education R&D to important educational topics and problems, are a prime example. Notwithstanding some bright spots, the institutes lack sufficient internal staff to mount credible programs to meet their mandates for comprehensive and high quality work and to provide national leadership on critical issues. The lack of internal and external resources means that the "critical mass" found in other research institutions to be necessary for an effective, high quality program is missing. With the current organization and resources, the institutes will sink into increasing irrelevance. This concern about critical mass extends to the R&D centers, which, in many instances, are far too thin for the work and leadership expected of them.

- In somewhat different, but equally important roles, the regional educational laboratories have immense missions, but only modest resources to achieve them. Some have addressed the critical mass problem by aggressive efforts to obtain resources from other sources, but they all still face a mismatch between ambitious missions and limited resources. And beyond the mission and resource mismatch, the regional laboratories face the added complexity of diffuse leadership and sponsorship from the federal and state local levels.

- The relationship between the centers and the labs is too distant and troubling. There are concerns that in a period of woefully inadequate resources, the nation is reaping less than it could from the collective investment in the two enterprises. The problem starts with perceived roles. Perhaps in caricature, the centers are sometimes seen as the thinkers and the regional laboratories as the interactors with practitioners. Any presumed virtue in such a split is out of touch with the realities about how practice will improve and how comprehensive reform is being implemented effectively. Both sets of institutions need to be thoroughly grounded in the realities of practice, while playing complementary and collaborative roles in solving critical RDC problems. The centers may emphasize their comparative advantage in broad analysis and conceptual framework, while the laboratories may emphasize integration with practitioner settings; but both should function closely together to maximize their collective impact.

- If the quality, utility and resources for educational RDC are to improve, more effort, focus, and resources will be needed to strengthen the supporting infrastructure in three different respects. First, user and consumer demand for better and more useable knowledge should more strongly reflect the underlying need. This will require a substantial educational effort and a strategy of inclusion in planning and execution. This effort will necessarily encompass better education of teachers to the value and use of R&D. Second, more resources can be used to attract new, highly qualified scholars from many disciplines to educational R&D and its issues. Lack of resources and prestige now inhibit such recruiting. Third, the institutions that undertake the critical work will need to be selected on merit, nurtured with sustaining resources and the demand for quality, and rigorously evaluated for performance.

- Up to now, there has been no systematic effort to trim the mission expectations of the federally financed RDC institutions to fit the limited resource availability. If more resources were to be forthcoming, this imbalance would start to correct itself. If, however, the expectations of more resources are unrealized, continuation of the mission-resource mismatch will have corrosive and cumulative consequences. A cycle of unfulfilled expectations leads to falling confidence, smaller resources, diminished capacity to recruit talent, few important results and reduced de facto expectations. This spiral will produce a series of worst outcomes for funders, researchers and the practitioner communities; and the institutes, in particular, are rapidly heading in that direction. Mission must be matched with money.

- Closely related to the matching of mission and resources is the issue of priorities and focus. The attention to both has been more rhetorical than real. The many topics of interest in educational knowledge building tend to be treated as if they were of equal importance. A more serious job of priority setting is needed; and to that end, the Board has a parallel effort now underway on priorities. Those priorities need to be set with the educational problems to be solved firmly in mind.

Balance and Linkage. The issues of inadequate aggregate resources, critical mass and absence of priorities are coupled with serious issues concerning the balance and linkage in the continuum of educational RDC activities. This continuum ranges from fundamental research through large-scale demonstration and effective communication of knowledge and information to the practitioner community. The issues include:

- The portfolio of the U.S. Department of Education is bunched in two areas along this continuum: (1) applied research and small scale development; and (2) communication activities. The Department conducts essentially no basic research, and is not deeply involved in large-scale development or demonstration, especially about comprehensive or standards-based reform. The fundamental research—largely in the cognitive and neural sciences— is conducted elsewhere in other federal agencies, most notably the National Institute for Child Health and Human Development (NICHD), the Office of Naval Research (ONR), and to a lesser degree the National Science Foundation (NSF). There is also modest foundation support for basic educational research. The OERI institutes are contributing some of the important applied research aimed at comprehensive or standards based reform, testing and assessment. Altogether, it is not possible to characterize the total fundamental research programs as robust.

- Large-scale development, particularly centered on major comprehensive reform efforts, is supported by foundations, the Department and other private resources. The Department's participation has generally been modest and evaluative. It appears to have had some of its best success when demonstrations are tied to formula grants. While foundation and private sponsorship should be welcome, the

Department's direct sponsorship or other participation should be more vigorous than it is, provided the resources are made available for the purpose.

- Rather than complementing the focus of the Department, the pattern of foundation funding, with the exception of the few foundations supporting large-scale comprehensive reform experimentation, mirrors the federal focus. Foundations do appear to give more focus to curriculum and teaching topics than the federal program. The overlap may be healthy, but gaps are not. It is, moreover, the Board's impression that the fit and relationship are coincidental rather than deliberate.

- The location and level of fundamental research are of concern in several different ways. It is not desirable that basic research be sponsored or conducted in one organizational framework, but it is important that such work be linked to the applied research and ultimate practitioner communities that will make use of its findings. Staff in applied research organizations who understand the findings and who design the applied research will make the necessary linkages. And the linkage requires the identification of application problems from practitioner and applied research communities. Efforts to link across organizations are occurring more frequently, such as recent planning work concerning a new initiative among OERI, NICHD and NSF, but nowhere near the extent needed.

- The absence of substantial large-scale development activity with rigorous research and evaluation aimed at critical problems is noticeable. This concern is particularly strong in light of the continuing difficulties of scaling up small, promising developments that require systemic change for widespread success. Evidence of effectiveness on a large scale provides protection from faddism and insufficiently tested ideas.

- In those areas where demonstration activity does exist, the Department is making increasingly strong efforts to insure a knowledge-building component in the programs or projects in the form of research or evaluations. These activities are undertaken not only in the Office of Reform Assistance and Dissemination (ORAD), but also throughout the Department's programmatic offices. This dispersion of demonstration activity to the organizations with primary interest in the substance of the work is appropriate; and growing attention given by the Department and the Congress to the knowledge building component is welcome, and should be continued. What is not in place is a sense of strategy through which demonstration activity is linked to high priority problems and targets of opportunity that solid research suggests should be exploited through more widespread demonstration activity.

- At a more general level, concerning the gaps and unevenness, the science base supporting the applied agenda of the OERI and Departmental R&D activities is not clearly visible, which adversely affects its force and credibility. In some areas the science base does not exist at all. The existence and visibility of that base is an important element of its persuasiveness to funders. Such persuasiveness will require clear standards, more rigor, and a larger, better-integrated learning agenda.

- The proper involvement of the practitioners in knowledge-building and implementation activities is stimulating new thinking in many areas, including education. It is increasingly clear that practitioner success and acceptance of revised practice is strengthened by understanding and involvement. This realization is leading toward efforts to seek active participation and linkage of operating organizations and their teachers in the R&D planning, conduct and evaluation process by moving them to become "learning organizations," a concept with potential for schools. In this role, the practitioner community becomes vested in the objectives of the innovation and reform, provides helpful input to fitting concept to operational reality, and contributes a continuing basis for accountability and mid-course correction. Other supplementary ways are needed to create incentives for better acceptance of proven practice improvements.

- The more traditional approaches to dissemination, which leave to those in need of exemplary practice and sound knowledge the burden of finding it, are being found inadequate. This is particularly true for those undertaking large-scale comprehensive reforms. Even with the Internet and other forms of electronic access, the passive systems don't fully meet the needs of those with ambitious innovation agendas, and the volume of information can overwhelm the practitioners. The more intensive efforts appear to require a combination of traditional dissemination, technical assistance and short-term applied research or problem solving. A new set of intermediaries and adjustments in existing organizations are emerging to meet these needs, and dissemination needs to be reconceptualized in this broader context. It has been labeled here as communication to distinguish it from too narrow an approach. Seen in this light, the communication activities concerning the transfer of needed knowledge and information are found in many places. Communication activities are widely scattered in OERI and elsewhere in the Department. The technical assistance operations are housed in the programmatic components and the staff agencies of the Secretary's office. While consolidation of these different operations is not an attractive option for many reasons, a process which defines roles and links these related activities warrants more attention as user needs change.

Processes. The Board's review of the current RDC system included specific attention to important processes by which agendas are set, support is mobilized, resources are allocated, and progress is made, assessed and made known. The experiences and models in other federal R&D programs were examined for applicable lessons. These comparative systems are, of course, molded by the nature of the activity and its context, as is the case for education, thus making mechanical replication unattainable. Nonetheless, comparisons can provide insights for assessment, and four seem particularly salient to the current issues in the educational RDC process. Each involves matters in which there are important tensions, requiring a careful balance.

- The first involves the issue of agenda setting, in which two important objectives should be harmonized. On the one hand, long experience suggests that R&D is most productive if the researchers are given substantial latitude in initiating work on their own ideas or perceived problems. This is generally known as field-initiated research. On the other hand, there is a strong and continuing need to give the R&D agenda a sense of national focus and priorities aimed at the most important gaps in our knowledge and the most promising research approaches. The point is not to swing back and forth between these two important objectives, as has sometimes been the case in education, but to find ways to achieve them both in a balanced way. OERI has adopted several of the devices to create the desired harmony. The field-initiated emphasis for particular projects is well ingrained, complemented by a set of national issues and research questions within which the specific proposals can be reviewed. The national focus part of the balance, however, remains weaker than it should be.

One mechanism employed in NIH to help strengthen the national focus is a set of intermediate councils of external expertise from the research and practitioner communities that continues to work on the national priorities by building broader scientific judgment about important issues which leads to consensus about research needs and findings. Education lacks a similar process that ensures a continuing dialogue among OERI, the institutes, centers and regional laboratories plus other important educational research institutions and sponsors about critical research problems and opportunities. Filling this gap can be an important milestone in developing consensus about national priorities.

- The second issue centers on mobilization of support, discussed in part above in connection with adequate resources. Given the importance of federal funds in educational R&D, mobilization of support with respect to processes means the involvement of the federal political process in the RDC system. This interaction has had a troubled history, leading to suspicion and hostility. Continuation of adversarial attitudes is detrimental to the development of an effective educational RDC system. Respect for the responsibilities of the appropriate domain and of the research community and political policymakers is both necessary and a reality in other federal R&D programs. Where it works well, all parties—policymakers, researchers, operating officials and consumers—are engaged in setting broad objectives and parameters of the work, while leaving specific design and execution of projects to the sponsoring agency and the research and practitioner communities. At the present time, more effort appears to be directed at protecting the parties from each other rather than in collaborative objective setting.

It should be clearly recognized that this suggestion does not and should not put the Congress and its committees into the detailed design of specific projects, organizations, and processes. There has been far too much of that to the detriment of educational R&D quality, objectivity and productivity. At the same time, it should be equally clear that the Congress and its committees, as the sponsors and overseers of the work of the Department, have a crucial role in the establishment of goals and objectives and the oversight of accountability for their performance. It is not beyond the capacity of the parties to put in place collaborative processes for fulfilling those roles.

- The third issue centers on the allocation of resources, but is closely related to the roles of the Congress and the Department discussed above. The allocation of appropriated resources in OERI, particularly to and by the institutes, is heavily controlled by statutory and other distribution rules. While this rigid allocation was adopted to meet a particular concern at a prior point of time, its continuation frustrates responsiveness to new needs and circumstances; and it can be particularly damaging in dealing with new national priorities. In a well functioning system, these structures are simply unnecessary. For example, the emphasis on field initiated work is a strong objective in NIH, and is being achieved without statutory or regulatory prescription. Further, the Congress is experimenting with more discretion within the special education R&D structure. Given assurances among the parties, such an increase in flexibility should be tried in OERI.

- A fourth issue is the development of appropriate research methodologies and the establishment of standards of evidence to be applied to knowledge-building activities. The question of methodologies is a long-standing and difficult one. More rigor is desired and needed. Yet traditional rigorous methodologies such as randomized experiments are not routinely feasible, affordable or appropriate in education research, though control group methodology has a continuing and important role in the clarification of critical research issues. Further, the good work done by NICHD in reading research should not be regarded as an all-purpose endorsement of the medical research model. The output of educational R&D must be fitted to school classrooms where other approaches and measures will be required to assess impact and outcomes.

  The Board believes that endorsement of rigor needs to go further in detailing appropriate techniques. The choice is not between randomized techniques and nothing at all. There is an appropriate level of rigor associated with the stage and purpose of the research being undertaken. Carefully constructed case study work may be thoroughly appropriate for "micro" applied research to construct reliable hypotheses for further testing, but is clearly insufficient for confident projection of success in nationwide application. The Assistant Secretary for OERI and the Board are already engaged in the development of appropriate standards of evidence and more rigorous methodological standards, and will continue vigorously to pursue these important problems.

As we reflect upon the assessment of the current system, it is our conviction that important changes are needed if the educational RDC system is to survive and become an effective instrument in support of educational progress. Left where it is, the federal part of the system is likely to atrophy. That outcome, however, should be avoided, though this cannot happen overnight. The building effort will require vision and effort, and should begin soon. The important first step is to agree what an effective educational RDC system should be and outline a strategy to reach that vision.

A STRATEGY FOR IMPROVEMENT

Attaining the vision of an ideal system when reality is well short of that ideal requires a strategy for improvement that can be achieved over a reasonable time period. One must begin with incremental steps, but with a clear, planned, and measurable strategy to identifiable ends. The Board has no doubt, for example, that the Panel on Educational Technology of the President's Committee of Advisors on Science and Technology set forth a reasonable goal to increase RDC federal spending $1.5 billion annually. However, that amount obviously could not be wisely spent next year given the existing infrastructure. It is not, however, unrealistic to recommend that educational R&D increase to $500 million annually over the next five years. Such an increase could be wisely planned and spent.

The strategy should proceed on two different levels, led by an initiative that charts the path for a better, more inclusive and understandable approach to conducting the educational RDC system and that undertakes an important knowledge-building task in teaching and learning. Such an initiative would contribute to critically needed knowledge in the education of children, and serve as a prelude and beacon for further rethinking and action in strengthening the entirety of the educational RDC system, particularly within the U.S. Department of Education. This across-the-board re-examination and improvement would constitute the second level. Some of the key components of both levels are now apparent, while other components will emerge as the work proceeds.

It is possible now to do the planning for such additional resources by adding a learning agenda developed through the collaboration of this Board and the Assistant Secretary for OERI and linked to the Department of Education's strategic planning in the GPRA process and the Departmental budget. The first steps can be taken to open up the planning to the research and practitioner community. It can also include exploration with the Congressional committees about objectives and goals, and the integration of learning agendas in the GPRA process. The learning agenda, once reviewed and accepted, should be seen as a long-term contract among the stakeholders as to its objectives, resources and expectations. That process can grow and deepen, but it can be started now.

The Department and the Administration recommended an additional $50 million in the OERI budget and a counterpart $25 million in the NSF budget for a problem-centered educational research initiative. While not successful with the Congress, the concept of a new initiative in OERI research is sound. The Department and the Administration should renew the request for at least as much money with the new Congress. A useful way to begin a new, more balanced approach is an example or demonstration in which all stakeholders can gain confidence that such an approach can be effectively planned and managed, free of some of the impediments identified in the current assessment, while still adhering to agreed plans and principles. The Board would clearly focus such an initiative on the most important issue of teaching and learning, including applied research, initial development and substantial demonstration.

A strategy at the second level for balancing missions and resources among the educational R&D institutions—institutes, centers, and regional labs—is a difficult challenge. On the one hand, one is hesitant to diminish or destroy institutional capacity, if we can get the collective enterprise off a starvation diet. On the other hand, it makes no sense in the longer run to retain the full institutional structure at its current sub-optimum funding and staffing. Further, the combined resource, organization and allocation constraints now imposed on the institutes, for example, makes it impossible for them to fulfill their missions and the educational research needs of the nation. Yet the Board believes that components of their R&D work are both important and useful. The Board would recommend that time be provided to determine whether more resources are forthcoming and whether the results of a demonstration initiative prove satisfying.

In the meantime, the Department should review its processes and structure in two different ways. The strategic planning exercises developed for the first initiative and its successors about other topics can be used and reviewed as a means of coordinating and strengthening the assignments and work of the institutes, centers, and labs as an alternative approach to further detailing and prescription of missions. It seems plausible that this more flexible tool will be both more productive and satisfying to the participants. In addition, the Department should review mission assignments to institutes, centers, and labs that are receiving little or no attention for lack of resources and reduce the scopes of their missions or, where necessary, urge the Congress to do so.

The Department must also find an effective way to increase the internal capacity to manage increased effort as well as larger budgets. Without more resources in the next 3-5 years, the painful work of reducing or dismantling the scope and number of units in the institutional structure should commence. Any reductions that turn out to be necessary should be done with a steady eye on the priorities described earlier and an understanding that OERI's critical niche is high quality applied research that can make a difference in school classrooms.

There is an overarching and critical need to increase the high quality and cumulative scientific base for educational R&D. We must enhance the standards and methodologies through which educational R&D findings are produced and admit our ignorance of poorly supported recommendations. There is too much at stake in the education of American children for the next century to do any less. The Board and the Assistant Secretary for OERI are developing the standards to which all Departmental work should adhere. In addition, OERI staff should assure their knowledge and competence to assess important fundamental research done elsewhere.

OERI and Department should be playing a more active role in large-scale demonstrations, particularly related to comprehensive reform. It should also be recognized that more resources will be required for such purposes, and opportunities to fund innovation with formula grants should be exploited. The issues of scaling up are too important to leave out of the RDC agenda. Further, the full range of federal and non-federal efforts should be viewed comprehensively and formally or informally coordinated.

The development of an appropriate infrastructure is a multi-year undertaking that will require resources as well as planning for institution building and the attraction of new, highly skilled researchers. The Department should, however, begin soon a coordinated effort to build a support base for the program in the practitioner community, including the development and communication of model programs for increasing teacher awareness and use of high quality research.

This report has spoken to the emerging needs for more comprehensive support in technical assistance, dissemination and applied research functions especially for those who are undertaking comprehensive reform efforts. This report has also called attention to the creation of learning communities through which schools, school districts or whole states become actively involved from learning agendas to implementation of exemplary practice in the RDC enterprise. The Board believes that the OERI structure can play a constructive role in nurturing these developments. The kinds of work the regional labs already have underway in combinations of applied research, technical assistance and information sharing could well be more strongly focused to help states and school districts with comprehensive reform agendas. All of the OERI institutions should help create opportunities for the establishment of learning communities with local partners for projects from micro-experimentation to large scale development.

These key elements of the early stages of the strategy can evolve and grow as the effort gains momentum, and all should be anchored to the urgent national problem ahead. The time has come for change and action. With such change and the momentum it will generate, the national educational research, development and communication activities will become an increasingly important contributor to vitally needed educational system improvement. Without it, the nation is more likely to stumble along unhappy with school performance. We can and should surely do better than that.

REVISED DRAFT

THE EDUCATIONAL RESEARCH DEVELOPMENT AND DISSEMINATION SYSTEM

AN ANALYTIC MAPPING

Submitted to:

National Educational Research Policy and Priorities Board
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TABLE OF CONTENTS

Page

I. A Summary of Distinguishing Characteristics 1

- A. Background and Introduction 1
- B. Distinguishing Characteristics 2
  1. What are the Distributions of Effort and Resources? 2
  2. Who Spends the Resources on What? 3
  3. Who Are the Performers? 10
  4. Who Sets the Priorities and How? 15
  5. Where Are the Incentives? 17
  6. Given the Substantial Dissemination Budgets, Why is So Little Implemented Large Scale? 18
  7. Who Talks to Whom About What? 21

II. Definitional Issues 22

- A. Basic Research Versus Applied Research 23
- B. Research Versus Evaluation Versus Data Collection 23
- C. Applied Research Versus Policy Research 23
- D. Knowledge-Building – The Standards of Evidence 24
- E. Dissemination – What Constitutes Effectiveness 25

III. Planning and Execution of Education RD&D 29

- A. Views of Others 29
- B. Summary of Issues 30

IV. Methodological Issues 31

V. Governance Issues 32

VI. Integration of the Map 33

References 34

Chart 1 OERI Organization 11

Tables
1 National Research Institutes Funding Levels 6
2 National Institute Funding for Fiscal Year 1996 7
3 1997 Staff Levels 7
4 Fiscal Year 1997 Funding for Regional Labs 9
5 Klein's and Gwaltney's Examples of Dissemination Functions 27

Appendix Tables A-1-A-11

THE EDUCATIONAL RESEARCH, DEVELOPMENT AND DISSEMINATION SYSTEM

AN ANALYTIC MAPPING

I. A Summary of Distinguishing Characteristics

A. Background and Introduction

The educational research, development and dissemination (RD&D) system has been a frequently revisited topic over an extended period, dating back 30 years. The issues raised about the system remain uncomfortably familiar, no doubt to the frustration of those concerned with the collective enterprise and its impact on educational processes and performance. In many, but not all cases, the system characteristics and the issues they raise discussed herein will plow no new ground, raising questions as to whether the durability of identified problems lies with their inherent intractability, a weakness in process or imagination, or a problem of attitudes and a failure of will.

The broader issues in the current educational context can be seen as different or more acute than they have been over the history of the educational RD&D system. Those context changes point toward desirable change in the way our educational system works, suggesting value to be gained from well-done research and dissemination. The basic outlines of the change are well covered in scholarly and more popular journals, but not as yet as fully grasped by the public. A particularly readable, cogent and recent articulation of the broader context by Richard Murnane and Frank Levy (Murnane, R.J. and Levy, F. with forwards by Thomas W. Payzant and Robert W. Galvin/Edward W. Bales, 1996) makes the basic points:

- The cost of competitiveness began in the 1980s to force radical change in the skills required to succeed in the economy. In 1979, a 30 year old man with a U.S. high school diploma earned an average $27,700 in 1993 dollars. In 1983, that man of 30 years earned an average of $23,000 in 1993 dollars; while in 1993, the wage for such an individual dropped to $20,000. Only one half of men of 30 years of age in 1993 had gone beyond high school (a stable graduation rate over an extended period).

- Standard test scores are modestly up from 1980; however, almost half of all 17-year olds cannot read or do math well enough to get a job in a modern automobile plant (NAEP scores relative to requirements of Diamond-Star and Honda).

- The earnings differential between college graduates and high school graduates is growing, but analysis suggests that the skills required by employers do not necessarily require college. Those skills include not only the hard skills of reading, math and problem solving, but also "soft" skills in teamwork, communication and computer utilization. While the demand for college-provided skills has increased, college graduates are more likely to also possess those skills which should be learned in secondary school.

- Public opinion, until recently, did not associate educational performance problems with their local school and the linkage to changes in the economy, but more recent polling indicates a change in views. (See chapters 1 and 2, Murnane, R.J. and Levy, F., 1996).

- This economic context is only part of a substantial demographic and social change which further challenges the capacity of the educational system to meet society's needs.

This broader context creates both problems and opportunities for change in educational practice and the research which can fuel it. On the one hand, the public is striking out at the status quo in many areas, including the school systems which find themselves under siege in many jurisdictions; and on the other hand, the potential market for innovation, research and solid information should be high indeed.

It is in this context as well as the history of educational RD&D that the mapping of the existing system begins.

B. Distinguishing Characteristics

In order to set the framework for the old and new issues about the RD&D system, it is useful to review some of the distinguishing characteristics of the system. We seek to do so through the answers to a series of rhetorical questions, some of which are based on clear data, others on estimates, and some on opinions of experts and observers. All of the questions and their answers influence current and future trends and directions of the system. It is probably appropriate to note at this early point that "system" is used as a descriptive reference to how intents, resources and institutions concerned with educational knowledge-building have interacted, and does not imply any comprehensive or orderly process through which actions are taken or events occur.

1. What are the Distributions of Effort and Resources?

a. RD&D Spending as a Percent of Total Education Spending

Educational spending in the United States approximated $530 billion in 1995 or 7.3% of our gross domestic product (GDP). The aggregate national expenditures on educational RD&D are difficult to define and collect. If, however, one combines US Department of Education spending and foundation spending (both generously defined), one gets a total volume in the range of $0.9-1.0 billion annually, or about 0.2 percent of total educational spending. This excludes educational spending in other federal agencies, state and local governmental agencies and institutions, and private colleges and universities with their own funds. Even if these excluded resources doubled the educational RD&D system national expenditures, RD&D expenditures would still amount to less than one half of one percent of total educational spending.

Educational RD&D expenditures are a much smaller percentage of total expenditures than in other fields such as industry, health care, and defense (Vinovskis, 1996). The NRC staff estimated federal health research alone at 30 times larger than education (NRC, 1995), with health representing 12-13% of GDP. Citing a 1988 GAO report, Hawley (1990) asserts that education research funding is significantly lower than it was 15-20 years ago relative to education expenditures overall. The federal government spends less on education research today than it did twenty years ago in real dollars (Vinovskis, 1996). Biddle (1996) argues that while the Federal government pays fewer than 10 percent of school operation costs, only one tenth of one percent of those funds are allocated to research.

b. Basic Research, Applied Research, and Dissemination

According to Hawley (1990), the share of research funds allocated to basic and applied research has declined because of a desire by policymakers and practitioners for OERI and other ED research programs to resolve problems. Within OERI, resources have been diverted from research to dissemination. Hawley cites a 1989 Department of Education budget which shows that over 90 percent of OERI's research and improvement budget is spent on institutional support. This includes university-based research centers, the Educational Research and Information Clearinghouses (ERICs), and the regional education laboratories. He asserts that this focus on institutions restricts ED's support to a limited number of topics and hampers researchers from focusing on new problems in education research.

Other critiques of the educational RD&D system call attention to distributional characteristics of the system which reinforce or extend those noted above including:

- A limited amount of effort devoted to basic research relative to applied research, and more attention devoted to dissemination than to research.
- Small rather than large applied projects initiated by federal sources.
- A dissemination system that may be relatively comprehensive, but is also reactive (rather than proactive), inefficient and not discriminating.

2. Who Spends the Resources on What?

The educational RD&D investments of the sponsors of such work are as difficult to identify precisely and comprehensively as the distributions discussed in the prior section. The federal government accounts for the largest share of RD&D spending, which is done by the US Department of Education and other federal agencies, and is in the range of 50-100% more than the next largest sponsors, the foundations (a rough estimate based on available data). The spending by state and local governments (including state and local governmentally-owned educational institutions) plus private postsecondary institutions make an additional, but relatively small contribution. An unknown, but likely small contribution to educational RD&D is also made by private suppliers of educational materials.

Federal

The federal expenditures for educational RD&D are led by the US Department of Education. In response to a Congressional inquiry on research funding in FYs 1995 and 1996, the Department identified somewhat more than $600 million for FY1995 (includes a liberal view of RD&D, but excludes NCES). These figures are contained in Table A-1 in the Data Attachment.

Hawley (1990) estimated that OERI was responsible for one sixth of ED's research and development funds; and the OERI portion of the total program reported to the Congress for FY 1996 was a comparable 16%. As inspection of Table A-1 makes clear, the large bulk of the work is applied research and dissemination activity aimed at particular programs, plus evaluation activity. With respect to the character of this federal activity which we will address in specific ways throughout this paper, it is interesting to note not only its diversity, but also areas of limited activity.

There is relatively limited evidence of substantial basic research work, though the classification systems of the data do not facilitate the identification of such work. Beyond the evaluation of charter schools, the mounting of large experimental projects and scaling up of reforms and innovative small projects are not receiving federal sponsorship. As noted in the RD&D System Committee's September workshop, most school reform efforts taking place in schools today have not been funded by the federal government. Instead, these school reforms have received funding from foundations and corporations for development, evaluation, and funding (Hawley, 1990). Additionally, schools often contribute to dissemination funding through their Title I funds (Slavin, 1997a).

Hawley (1990) cites the numerous federal agencies involved in funding education research. These include:

- National Science Foundation
- National Institute for Child Health and Human Development, Department of Health and Human Services
- National Institute on Disability and Rehabilitation Research, Department of Health and Human Services
- Department of Labor
- Department of Defense

The federal budget documents prepared by OMB do not readily provide the information on the amounts and content spent by these other agencies on educational RD&D. Such information, if available at all, must be obtained directly from sponsoring offices. As a general matter, most of the educational RD&D in agencies other than the US Department of Education (ED) is directed to work directly supportive of the agencies' mission. It also tends to be applied. That is not necessarily the case, however, for either the National Science Foundation (NSF) or the Department of Defense (DOD). NSF is explicitly interested in basic research; and the DOD's broad interests led it into considerable basic and applied work related to education, training and human behavior as it relates to its large training and operational activities.

Office of Education Research and Improvement (OERI)

Fiscal year 1997 funding was $398.1 million. 47.6 percent of this was for the traditional programs - NCES, the centers and labs, field-initiated research, and ERIC. Increasing amounts are spent on educational technology and dissemination. In FY1997, approximately the same amount was spent by OERI on education technology projects as on traditional centers, labs, field-initiate research, and ERIC combined (Vinovskis, 1997).

OERI declined in staff members from 448 in FY92 to 358 in FY96, and to 338 in FY97. At the same time, the real budget of OERI has increased, so that each employee represents $1.5 million in constant 1996 dollars (Vinovskis, 1997).

Within OERI, the primary elements include: the National Research Institutes with their components — university-based education research centers, field-initiated research and directed programs; the Office of Reform Assistance and Dissemination with their components — development and demonstration programs, state and local support including the regional laboratories, learning technologies initiatives, professional development, recognition and dissemination programs; and dissemination activities embedded in several OERI organizations. The resource levels for these activities are indicated below.

National Research Institutes. The fiscal year 1997 funding priorities are shown in Table 1 below. The five institutes were authorized at $100 million for fiscal year 1996 (Vinovskis, 1997). However, the actual amount available was only $43 million in FY96 and FY97. Institutes must spend at least 20 percent of their budgets on field-initiated research in FY96 and FY97, and 25 percent in 1998 and 1999. At least one third of the funds were to be allocated to national research centers in FY96. Table 2 shows the distribution of FY1996 resources by institute, taking account of the various mandates and set-asides.

Table 1

NATIONAL RESEARCH INSTITUTES FUNDING LEVELS

(in thousands)

	1995	1996	1997
Achievement Institute			
Centers	$13,700	$9,600	$9,600
Field-initiated studies	0	2,580	2,580
Special studies	0	0	100
Cross-cutting activities	0	600	600
Peer review	0	120	20
Subtotal, Achievement Institute	13,700	12,900	12,900
At-Risk Institute			
Centers	7,600	9,000	9,000
Field-initiated studies	0	2,580	2,580
Special studies	0	0	120
Cross-cutting activities	0	1,200	1,200
Peer review	0	120	0
Subtotal, At-Risk Institute	7,600	12,900	12,900
Policy Institute			
Centers	4,800	2,800	2,800
Field-initiated studies	0	860	860
Special studies	3,200	0	40
Cross-cutting activities	0	600	600
Peer review	0	40	0
Subtotal, Policy Institute	8,000	4,300	4,300
Early Childhood Institute			
Centers	1,500	2,750	2,750
Field-initiated studies	0	1,290	1,290
Special studies	0	500	560
Cross-cutting activities	0	1,850	1,850
Peer review	0	60	0
Subtotal, Early Childhood Institute	1,500	6,450	6,450
Postsecondary Institute			
Centers	5,400	5,000	5,000
Field-initiated studies	0	1,290	1,290
Special studies	0	100	160
Cross-cutting activities	0	0	0
Peer review	0	60	0
Subtotal, Postsecondary Institute	5,400	6,450	6,450
TOTAL, Institutes	36,200	43,000	43,000
(Non-add)			
Total, Centers	33,000	29,150	29,150
Total, Field-initiated studies	0	8,600	8,600
Total, Special studies	3,200	600	980
Total, Cross-cutting activities	0	4,250	4,250
Total, Peer review	0	400	20

Source: US Department of Education, Justifications of Appropriation Estimates to the Congress, 1997.

The implications of the reduced internal staffing resources for OERI on the institutes are shown in the current distribution of institute staff on Table 3.

Table 2

NATIONAL INSTITUTE FUNDING FOR FISCAL YEAR 1996

Institute	(a) Funds to Support Activities Contract (10% of total)	(b) Funds to Board (2% of $1 million)	(c) Funds for Field Initiated Research (20% minimum)	(d) Funds to Support RC(s) (33% minimum)	(e) Funds Available for Any Type of Activity by the Institute (maximum)	Total (FY 96)
At-Risk	3,000,000	225,000	5,355,000	8,925,000	12,495,000	30,000,000
Achievement	3,000,000	225,000	5,355,000	8,925,000	12,495,000	30,000,000
Policy	1,000,000	75,000	1,785,000	2,975,000	4,165,000	10,000,000
Early Childhood	1,500,000	112,500	2,677,500	4,462,500	6,247,500	15,000,000
Postsecondary	1,500,000	112,500	2,677,500	4,462,500	6,247,500	15,000,000
Total	10,000,000	750,000	17,850,000	29,750,000	41,650,000	100,000,000

Source: Pelavin

Table 3

1997 STAFF LEVELS

Institute	**1997 Staff**	
	Professional	**Total**
Education of At-Risk Students	13	17
Student Achievement, Curriculum, and Assessment	18	22
Educational Governance, Finance, Policy Making, and Management	9	14
Early Childhood	6	10
Postsecondary, Libraries, and Lifelong Learning	11	14
Totals	57	77

Source: OERI data, 1997.

National Education Research Centers. The centers have had a changing level over the years, rising to as many as 18 with quite small budgets. More recently, the centers have been a smaller number, and stand at twelve in FY97. The average annual spending of the centers was $2.76 million in FY97. However, only the National Center for Research on the Education of Students Placed at Risk ($5 million) and the National Center for Research on Education, Diversity, and Excellence ($4 million) are well-funded. Eight other centers are funded at $2.5

million to $2.8 million each, and another at only $1.5 million (Vinovskis, 1997). The new centers often have partners at many colleges and universities, making coordination very complex. The current national education research centers are:

- Center for the Improvement of Early Reading Achievement (CIERA) (University of Michigan)
- Center for Research on Education, Diversity and Excellence (CREDE) (University of California, Santa Cruz)
- Center for Research on the Education of Students Placed At Risk (CRESPAR) (Johns Hopkins University)
- Center for Research on Evaluation, Standards and Student Testing (CRESST) (University of California, Los Angeles)
- Center for the Study of Teaching and Policy (CTP) (University of Washington)
- National Center for Early Development and Learning (University of North Carolina-Chapel Hill)
- National Center for Improving Student Learning and Achievement in Mathematics and Science (University of Wisconsin)
- National Center on Increasing the Effectiveness of State and Local Education Reform Efforts (University of Pennsylvania)
- National Center for Postsecondary Improvement (Stanford University)
- National Center for the Study of Adult Learning and Literacy (Harvard University)
- National Research Center on English Learning and Achievement (CELA) (University at Albany, SUNY)
- National Research Center on the Gifted and Talented (University of Connecticut at Storrs)

Since 1990, the centers have been reduced in number, redirected in their missions to mirror somewhat more directly the thrust of the national institutes and increased somewhat in size. They clearly provided a somewhat different base than the older, more established regional laboratories, which was seen by some as an injection of new thinking and a stronger research emphasis than the regional labs.

Office of Reform Assistance and Dissemination (ORAD). ORAD manages a large portfolio of development and demonstration projects ($185 million in FY97 out of a total ORAD budget of $245 million). Sixty two percent of those projects have an outcome evaluation component. The ten Regional Laboratories were financed in FY97, as shown on Table 4, at a $51 million total level to undertake varied and complex missions, which are described later in more detail. The National Commission of Professional Teaching Standards was supported at the $5 million level in FY97 and the Gifted and Talented Center at $1.5 million, of which $4.4 million constituted basic and applied research. Other ORAD funds support the work of expert panels in identifying promising and exemplary programs, and dissemination activities.

Table 4

FISCAL YEAR 1997 FUNDING FOR REGIONAL LABS

Lab	States Served	1997 Funding
Northeast and Islands Laboratory at Brown University	Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, Puerto Rico, and the Virgin Islands	$6.1 million
Mid-Atlantic Laboratory for Student Success	Delaware, Maryland, New Jersey, Pennsylvania, and Washington, DC	$5.2 million
Appalachia Educational Laboratory	Kentucky, Tennessee, Virginia, and West Virginia	$4.1 million
Southeastern Regional Vision for Education	Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina	$5.6 million
North Central Regional Educational Laboratory	Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin	$6.6 million
Southwest Educational Development Laboratory	Arkansas, Louisiana, New Mexico, Oklahoma, and Texas	$5.5 million
Mid-continent Regional Educational Laboratory	Colorado, Kansas, Missouri, Nebraska, North Dakota, South Dakota, and Wyoming	$4.2 million
WestEd	Arizona, California, Nevada, and Utah	$5.5 million
Northwest Regional Educational Laboratory	Alaska, Idaho, Montana, Oregon, and Washington	$5.2 million
Pacific Region Educational Laboratory	American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Hawaii, Republic of the Marshall Islands, and the Republic of Palau	$3 million
Total		$51 million

Source: OERI, 1998.

The Dissemination Program. The OERI dissemination program of approximately $50 million in FY97 is dispersed in four different entities. It includes the activities of the National Library of Education which encompasses ERIC, an 800 number electronic system and the library collection. It includes the outreach and printing activities of the Office of Media and Information Services. And it includes a range of dissemination supporting activities of the Institutes and ORAD.

Foundations

The foundations, which are estimated to be the second largest source of educational RD&D financing after the federal government, sponsor a wide range of education and education-related programs and activities, a fraction of which can be considered RD&D activities. Most of such sponsorship goes to institutional or student support, and thus is not appropriately treated as RD&D. Like the federal government, there is no documented source of foundation-supported RD&D. Based on some special studies and anecdotal conversation, we believe that total to be in the range of $325-400 million annually. These data collection results are attached, showing first annual amounts of commitments or spending of major foundations with education interests which can be treated as education R&D, and second major initiatives (several multi-year) of a larger group of foundations which relate directly or indirectly to educational research (Tables A-2 and A-3).

Within the foundation funding, one can find some clear examples of sponsored basic research, but the bulk of it from its description would fall in the categories of applied research and dissemination. Much of it is seeking improved quality of education in some dimension for all or for particular populations. It is also the source of financing for educational reform, in some cases for substantial demonstration projects.

3. Who Are the Performers?

Education RD&D is performed by individual consultants and researchers and by a wide range of institutions. These institutions include universities and other educational institutions, non-profit and for-profit research organizations, a growing number of intermediary technical assistance organizations, and governmental agencies. In this section, we will concentrate on the OERI governmental structure and universities. Discussion of the intermediaries will come in a later treatment of dissemination.

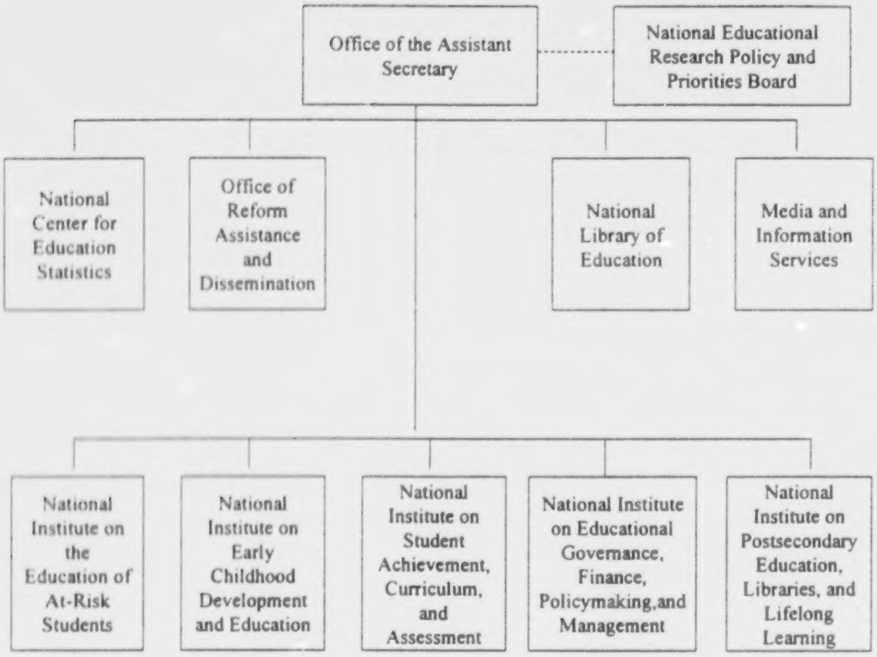
OERI

The OERI structure is portrayed on Chart 1 below. For this discussion, we will concentrate on the National Institutes and the Office of Reform Assistance and Dissemination (ORAD). While NCES is appropriately considered part of the knowledge building system, it is not integral to the RD&D system, and thus not treated as a performer. The same judgment is made about other components of OERI.

National Research Institutes. Goals 2000: Educate America Act in 1994 established five National Research Institutes within OERI:

Chart 1

OERI ORGANIZATION


Office of the Assistant Secretary
National Educational Research Policy and Priorities Board
National Center for Education Statistics
Office of Reform Assistance and Dissemination
National Library of Education
Media and Information Services
National Institute on the Education of At-Risk Students
National Institute on Early Childhood Development and Education
National Institute on Student Achievement, Curriculum, and Assessment
National Institute on Educational Governance, Finance, Policymaking,and Management
National Institute on Postsecondary Education, Libraries, and Lifelong Learning

- The National Institute on Student Achievement, Curriculum, and Assessment
- The National Institute on Postsecondary Education, Libraries, and Lifelong Learning
- The National Institute on Governance, Finance, Policy-Making, and Management
- The National Institute on the Education of At-Risk Students
- The National Institute on Early Childhood Development and Education

Vinovskis (1997) noted that the Institutes have pursued their own research agendas rather than working on an integrated strategy. He surmised that this may be due to the fact that there is no one who oversees an overall research agenda. Each of the Institute directors reports directly to the Assistant Secretary.

The National Research Institutes funded 11 research centers in fiscal year 1997. Vinovskis (1997) noted that many of the centers fund too many small projects that are not well integrated. The centers pursue basic and applied research and dissemination rather than the long-term development of education materials and models.

Office of Reform Assistance and Dissemination (ORAD). The Office of Reform Assistance and Dissemination has four divisions:

- State and Local Support Division (SLSD)
- Knowledge Applications Division (KAD)
- Development and Demonstration Programs Division (DDPD)
- Learning Technologies Division (LTD)

In March 1997, ORAD had 61 staff members (Vinovskis, 1997). ORAD includes the regional education laboratories and ERIC. ORAD is also responsible for identifying promising models, development and testing them, and disseminating the information (Vinovskis, 1997).

Regional Laboratories. The Regional Laboratories were developed in 1965 as part of the Elementary and Secondary Education Act. In 1994 the program was reauthorized to "promote knowledge-based school improvement to help all students meet high standards and to help the nation meet the National Education Goals." The goal of these ten labs is to provide information on research and knowledge from practice to individuals working to improve education (OERI, 1996). Two new goals established in the 1994 legislation were bringing together successful state and local reform efforts, and scaling-up successful reforms to be adopted (Vinovskis, 1997).

Each of the ten labs is governed by a board that represents teachers, researchers, and policymakers in the region. The functions of these regional laboratories include:

- providing information, training, and technical assistance, and developing or implementing programs,
- developing models for systemic reform and expanding exemplary reforms,
- improving access to research and best practices,
- collaborating with the community in development and dissemination,
- working with other ED-funded technical assistance providers, and
- bonding with the research community.

Below we briefly describe the specialities of each of the ten regional labs.

Northeast and Islands Laboratory at Brown University (LAB): The three areas of assistance that LAB focuses on are teaching and learning, the school environment, and partnerships for systemic reform. LAB attempts to impact schools directly by developing curricula; providing support for students from language minority, urban, and disadvantaged backgrounds; providing professional development; working with the community on school improvement; and promoting technology in the schools. LAB has a specialty in language and cultural diversity and engages in applied research aimed at meeting the needs of language and culturally diverse students.

Mid-Atlantic Laboratory for Student Success (LSS): The goals of LSS research and development are to identify effective educational practices and policies currently being used, create new classroom instruction methods, and improve school environments to increase students' chances of success. LSS has a special focus on urban education, and attempts to improve the success of children in urban schools. The Services to the Field Unit provides access to information services, technical assistance, and training resources; links to existing system of dissemination and professional development resources; and collaborative research with practitioners.

Appalachia Educational Laboratory (AEL): AEL is conducting a research and development project with each of the states it serves. The foci of these various research projects are student writing, Internet-based instruction, technical assistance for improving student achievement, and using the education information system to inform instructional decisions. AEL's specialty area is rural education. They produce an annual paper on rural education issues, an electronic journal, and a rural education digest.

Southeastern Regional Vision for Education (SERVE): SERVE's applied research and development projects include indicators of school progress, a self-assessment process for high schools, teacher evaluation measures, and professional development opportunities for teachers. SERVE also organizes study groups to examine promising programs and how to scale them up. SERVE is conducting a national assessment of critical needs in early childhood education, its specialty area. SERVE-Line provides educators with a networking tool that allows them to share resources. SERVE has also created an internet service which provides educators with searches of educational literature.

North Central Regional Educational Laboratory (NCREL): NCREL has five centers working on applied research and development. The Teaching and Learning Center collects information, researches, and disseminates research on teaching and learning. The Center for School and Community Development helps schools plan and make decisions by identifying research and models of best practice and by providing technical assistance, training, and consulting. The Center for Scaling Up aims to improve knowledge about how to replicate proven programs and practices, and helps in the implementation. The Evaluation and Policy Information Center develops networks of researchers, tracks reform efforts, conducts short-term research to influence education policy, and holds online policy seminars. The Technology for Educational Achievement Center, working on NCREL's specialty area, studies technologies to determine their potential benefits in the schools and examines policy issues of applying new technology to education.

Southwest Educational Development Laboratory (SEDL): SEDL's research, development, and dissemination goals include increasing family and community involvement in education, addressing diversity, promoting policy development, improving instructional systems, applying technologies to education, and altering the organization of schooling. The speciality area of SEDL is language and cultural diversity. In this area they will examine effective school characteristics, the teaching and learning environment, development of school staff competencies, native language development, assessment methods, and parental and community involvement.

Mid-continent Regional Educational Laboratory (McREL): McREL's four research programs aim to improve standards, curriculum, assessment, and instructional strategies; identify human development and motivation factors that improve learning; develop tools to improve organizations; and increase knowledge about the effect of educational systems on systemic reform efforts. Their field services activities include publications, technology networks, databases, distance education networks, meetings, training, technical assistance, and dissemination. McREL's specialty area is curriculum, learning, and instruction. They are working to synthesize standards developed nationwide.

Uniting the Far West Laboratory for Educational Research and Development and the Southwest Regional Laboratory (WESTED): WESTED's applied research and development efforts focus on whole school reform, language and cultural diversity, and early intervention. Whole School Reform aims to help schools become coherent organizations by using assessment to alter current school culture, and adapting and implementing three Johns Hopkins University school improvement models: Talent Development Schools, Success for All, and Roots and Wings. Language and Cultural Diversity aims to improve schools' treatment of diverse students through professional development. Early Intervention, Care and Education aims to integrate education with other social services, private organizations, community groups, and family members. WestEd's specialty area is assessment and accountability, and they aim to use assessment to measure and improve students' performance.

Northwest Regional Educational laboratory (NWREL): NWREL focuses on assessment and accountability, early childhood education, rural education and school change processes. In their specialty area, school change processes, NWREL convenes practitioners, policymakers, assistance providers, researchers, and program leaders to learn about processes for changing schools.

Pacific Region Educational Laboratory (PREL): PREL has brought together a team of educators from public, private, and higher education to conduct applied research and development. PREL's specialty area is language and cultural diversity. PREL works with the other two laboratories assigned this specialty area to develop a complementary program of research in this area.

From this discussion it is clear that the research laboratories are attempting to achieve a great deal considering their limited budgets. Additionally, many of these labs overlap in the types of research efforts they are conducting.

Institutions of Higher Education

Institutions of higher education are the places where most educational research gets done. Institutions fund research on education through internal grants, dissertation support, research assistantships, leave time for research, faculty travel funds, computers, other equipment or supplies, and seed money to start projects and generate outside support (James, 1992). According to McCarthy (1990), academia has not been a relied on source for education policy, as policymakers have traditionally relied on information from their staffs, lobbyists, and state education staff. The reason for academic's lack of influence may be due to their perceived lack of knowledge and interest in problems schools are facing. Even when education researchers do work on issues of interest to policymakers, the results are not often presented in a way that they will be adapted by policymakers.

University-Based Education Policy Research Centers. A particular form of university-based education research has been the centers which provide research findings on education matters and policy options to policymakers and education leaders. The purpose has been to bridge the gap between researchers, policymakers, and practitioners. In 1990, 18 such centers existed. The centers have been envisioned as a method by which to join researchers, policy-makers, and practitioners in solving the problems facing schools. Most have a primary mission to "inform the policy-making process by presenting nonpartisan, research-based information to policy-makers." They may compare the advantages and disadvantages of different policy options, and evaluate the effect of various initiatives. Centers also conduct studies; host conferences, workshops, seminars, and forums; track reform efforts; provide technical assistance to teachers and state departments of education; and monitor data to identify new education issues (McCarthy, 1990).

4. Who Sets the Priorities and How?

In examining the system for annual expenditures in the range of $1 billion on educational R&D, it is reasonable to consider who sets priorities and how it is done on either the macro or micro level (e.g., national and within particular institutions of importance). This consideration begins with enumerating the potential actors in the process.

Obviously, the most directly concerned are the sponsors of the research and the research performers identified in answer to the previous question. The sponsor described in the answer to the second question are primarily the federal government and the foundations, each containing a large number of individual institutions with substantial or complete autonomy. Even within large individual federal institutions such as ED, DOD or HHS, there are subordinate organizations involved with educational RD&D which operate with considerable independence. Individual foundations, likewise, have total freedom of action, though more have chosen in recent years to collaborate around large initiatives.

Beyond the directly involved sponsors and performers, there are other directly affected groups which have substantial stakes in the educational RD&D activity. These include policy-makers at all levels, managers of educational institutions, teachers, educational support vendors, and the consumers—students, parents and the public. The policy-makers include those with legislative and executive responsibilities at all levels—both public and private. The managers include those in both private and public institutions; and the educational vendors of particular interest are the textbook publishers and the assessment and testing organizations.

Together, this is a potentially enormous group who can contribute to and have a stake in the results of education RD&D activities—enough to fill one or more concert halls. Education, like other areas, faces extended constituencies, making participatory processes complex, time consuming and difficult. Somewhat unlike other areas, education approaches the processes with a somewhat different mind set than other functional areas. It is more ready than other areas to grant all interested parties equal status with not only advisory responsibilities, but also decision-making power on a very wide range of RD&D matters, on at least an implicit assumption of equal competence. Other functional areas are likely to be equally inclusive in advisory activities, but somewhat more tailored in decision-making to match responsibilities and competence with the substance to be decided.

As a general matter, priority setting in educational RD&D is a highly fragmented process. Within the federal process, there is no formal process other than the budget to link the agencies together, and then only if OMB staff or an Administration initiative take special steps to do so. We are unaware of any recent effort to do so, leaving whatever informal interagency coordination to the primary agency actors. Periodic informal efforts are made.

At the Department level, a more substantial effort has been and is being made through the mechanisms of strategic plan and the performance measurement system prescribed by the Government Performance and Results Act of 1993 (GPRA). This statute now moving into serious implementation calls for each department and agency to submit a five year strategic plan to OMB and Congress (first formally submitted by ED in the fall of 1997) followed by performance indicators for assessing progress toward goals and objectives (formally due to Congress in January 1998, but already submitted in part by ED). This process provides an additional device through which the Department can coordinate and integrate its knowledge-building activities. The Department has received and initially adopted a recommendation to include an annual analytic agenda as part of its strategic planning process to focus on key knowledge-building requirements over the next five year period (Morrill and Weiss, 1997).

Given the requirements of the Educational Research and Improvement Act of 1994 for the Assistant Secretary of OERI and the National Educational Research Policy and Priorities Board (NERPPB), there is apparent interest for the Assistant Secretary and NERPPB to coordinate its efforts with those of the Department in meeting the requirements of GPRA with respect to knowledge-building activities. There would appear to be substantial mutual benefits in NERPPB being able to better extend its reach beyond OERI programs and the Secretary's ability to make better known to the research community the Department's sense of research needs. Collaboration rather than confrontation would appear to route to more positive outcomes.

In pursuing this direction, NERPPB faces two kinds of problems in the existing RD&D system. The first is a deeply in-grained distrust between the Department's RD&D community and perhaps a significant share of the external research community on the one hand and the Secretary and his staff and a significant share of the political community on the other. In caricature, from the research perspective, the research office and community is engaged in the production of truth and light for national consumption, while the Secretary and staff are consumed with Departmental programs, Administration initiatives, and politics with little regard for the knowledge base. From the other end of the telescope, the scene is different for Departmental leadership struggling with a set of difficult substantive and political problems to make incremental improvements, while the research arm of the Department continues to drift in irrelevance, minutae and unresponsiveness. Efforts have been and are being made to lower that distrust, but continued progress will be important to effective processes in priority setting.

A second problem arises from NERPPB's mission to go beyond the boundaries not only of OERI work and the Department, to include the national educational RD&D agenda and its priorities. There are no formal processes for such an undertaking, and should not be (the statute, while calling for a national perspective, is modest in its expectations). While some federal mission agencies come close to such dominance in their area, (e.g., Defense and space), few others dominate the national RD&D sponsorship. And for the intellectual health and independent inquiry, such dominance is not a desirable goal, even though it simplifies priority setting.

Notwithstanding the value of decentralization, there are less formal steps that can be taken to help shape priority setting. One such step is a periodic statement of priorities as NERPPB now prepares. A second approach is through careful dialogue and collaboration with other sponsors. Other agencies seem far more aggressive than ED in dialogue with foundations about collaborative agendas.

5. Where Are the Incentives?

In the RD&D System Committees workshop in September 1997, several of the speakers raised the question of incentives, and pointed to the apparent lack of incentives to innovate and make use of the products of research and development. Other questions touching on incentives were raised such as the observed small investments in R&D made by textbook publishers relative to those made by health care product companies. It thus seems appropriate briefly to summarize the apparent incentives for the conduct and use of quality RD&D so that they may be considered in the committee's subsequent work.

- *Incentives for the education system at the operating level.* While the incentives are considered positive at the abstract rhetorical level, it is less clear that they are, in fact, uniformly positive. Change is unsettling; and education is a community awash in new ideas and fads. Teachers live very full lives with little time for reflection and, sometimes, professional development. And school governance is full of layered power centers, in which presumed hierarchial relationships are more in name than in fact. Thus, the market for innovation and easy acceptance of new research is mixed at best.

- *Incentives for the knowledge-builders and data gatherers.* The low levels of educational research spending have not historically encouraged researchers to enter the field, particularly the absence of substantial empirical studies and basic research. The growing concerns with the status of education appears to be attracting more good quality researchers to educational issues. This trend could, no doubt, be strengthened by more funding and increasingly higher standards in research quality.

- *Incentives for educational materials and service providers.* It has been noted that textbook publishers and test providers put relatively little resources into research, relative to drug companies in the health field. The analogy is interesting, but not compelling without consideration of monetary incentives. Drug companies are in a position to recapture their very large R&D expenditures through pricing and patent protections which allow recovery of such costs along with handsome profits for their successful products. It is not so clear that copyright protections and the competitive environment permits textbook publishers to follow a comparable course. Further, the recovery of the R&D on drugs from the consumer of the drug is a more comfortable notion than the recovery of educational R&D only from the purchaser of particular textbooks.

- *Incentives for policy-makers and consumers.* In the case of both policy-makers and consumers, there is reason to believe that solid innovation and quality educational R&D is, on balance, positive. However, the ideological load on education is such that change of whatever kind can and will be regarded with hostility by some.

Thus, the incentives for innovation and research in education can be regarded as mixed over-all. It is certainly less positive than the health field where the new and innovated is regarded as an unalloyed good, much in demand by the public.

6. Given the Substantial Dissemination Budgets, Why is So Little Implemented Large Scale?

This perplexing question has been addressed in the literature and elsewhere with a wide range of answers. Some are inclined to fault the content and quality of underlying research; others fault the dissemination for the poor results; and one might add that the culprit could lie in the barriers that exist within educational institutions, particularly their governance systems.

Underlying Research. Those that fault the underlying research have identified a wide range of targets:

Misdirected Content
Slavin (1997a) states that while Federally funded educational research has produced much information that may be useful to educational practice, little of the research has been used to create widespread program change and major reform.

Low Federal Investment in Education RD&D

Slavin (1997a) suggests that education research has not had the influence of research in medicine or science because of a relatively low Federal investment.

Federal Policies

Slavin (1997a) argues that education research has not had a large influence on policy because of federal policies which prescribe staying away from curriculum development.

Lack of Training and Technical Assistance

Slavin (1997a) states that education research is not implemented often due to a lack of training and technical assistance.

Low Quality of Research

Kennedy (1997) asserts that education research has not impacted teaching because the research is not persuasive or authoritative; the quality of the research is not good enough. Slavin (1997b) argues that the lack of confidence in education research is a cause of its lack of influence, "We can never have meaningful progress in educational programs until we can have the same level of confidence in them that physicians can have in procedures or medications passed by the Food and Drug Administration."

Research is not Practical

Kennedy (1997) says that the research often cannot be applied because it is not practical, and does not address teachers' questions or constraints.

Research is not Presented for Teachers

Kennedy (1997) says that research often is not adapted because is not expressed in ways that teachers can comprehend.

Education System is Too Rigid or Too Unstable

Kennedy (1997) states that research has not had large impacts on teaching because the education system is rigid, or conversely it is unstable and too willing to follow fads.

Absence of Field Initiated Research

Hawley (1990) asserts that an absence of field-initiated research negatively effects the spread of research findings throughout the nation.

Dissemination System. Others find the dissemination system dysfunctional in important ways.

According to Klein (1992), the current dissemination system is a haphazard combination of many different previous attempts to improve dissemination. Louis (1992) also argues that the dissemination system is composed of uncoordinated, or even competitive activities.

Klein and Gwaltney (1991) argue that different dissemination programs are often not coordinated with one another. Klein (1990) studied 100 education-related clearinghouses and found that other than the 16 ERIC ones, they did not coordinate information or services on a regular basis. White (1990) also noted the fragmentation of the education dissemination system. Some of her examples cited by Klein and Gwaltney (1991) were the lack of connection between OERI-funded R&D centers focusing on at-risk children and Program-based dissemination activities including the bilingual education clearinghouse, the bilingual state capacity building grant Program, the Chapter 1 Technical Assistance Centers, or the Early Childhood Technical Assistance System. She also found that dissemination activities of the Regional Labs were not linked to other dissemination Programs of the Department. Louis (1992) also noted that the Regional Labs have been isolated from other dissemination efforts. White (1990) argues that such lack of coordination and communication is a problem because effective techniques are not shared and consumers may receive contradictory information from different parts of ED.

The coordination problem does not exist only within ED, but within other federal agencies conducting education research as well (Klein and Gwaltney, 1991). Often competition is the rule rather than coordination. Materials from one agency are not regularly disseminated with the programs of another, and staff communication is rare. They cite several examples, including:

- The Department of Health and Human Services does research on learning, family structure, integrated service delivery, and funds dissemination activities related to education.

- The Department of Labor funds research on dropouts and illiteracy, and funds dissemination activities related to education.

- The National Endowment for the Humanities funds research and dissemination on students knowledge of history and the humanities. Only recently has some cofunding of activities occurred.

- The National Science foundation has worked on the teaching of math and science. Only recently has some cofunding of activities occurred, but more is planned.

Christopher Cross, former Assistant Secretary of OERI, did begin a movement toward increased coordination between different programs at ED and with other agencies.

Biddle (1996) also argues that a lack of organization in our dissemination system is a reason for the lack of use of education research. He states that even when the research we need has been done, "we are unable to find reports of it amidst the confusing oversupply of information in our mass society."

Klein and Gwaltney (1991) argue that a nationwide dissemination system should be developed. This system would contain information on:

- education programs, policies, contracts, grants, and data
- education literature
- promising and effective or exemplary education programs, products, practices, policies, and public information (selected on quality)
- syntheses and interpretations of education research and knowledge

Hawley (1990) argues in favor of an "interagency coordinating council for education-related research." This council would be chaired by the Secretary of Education and would maintain a database on all education research currently being funded. As well as increased coordination, OERI should allow for long-term research projects and ensure stability in funding of education research.

The concern about the dissemination system has taken an interesting recent focus with the emergency of intermediary organizations in connection with major reforms efforts in the K-12 system, such as New American Schools and the reforms using the work of Robert Slavin. These intermediary organizations combine the functions of research and technical assistance in a continuous, hands-on interaction with the school system attempting comprehensive reforms. The perceived need for and early positive indicators from this process suggest that effective dissemination of educational research related to major reform may need a far more proactive form of dissemination to achieve substantial implementation.

Educational operational governance. The preceding observation leads to at least a hypothesis that the complexity and dispersal of power within school systems among teachers, principals, superintendents, school boards, and other staff is such that the local governance structures themselves defeat large scale reform efforts based on R&D. While not written about quite in this way, this hypothesis would appear to be at least an implicit assumption in those advocating voucher systems extending to private schools.

7. Who Talks to Whom About What?

We have discussed elements of the communication problem in response to earlier questions about spending, performers and priority setting. We return to the communication question due to its salience in the identification of system problems and development of remediating strategies. One can think about these additional communications issues at three different levels: (1) communication among the knowledge-builders; (2) communication among the knowledge-builders, the sponsors and policy-makers; and (3) communication between knowledge-builders and the educational operating institutions.

Among knowledge-builders. As we will note in the following definition section of this paper, the several different disciplines which are appropriately brought together in educational R&D have different traditions and standards as to what constitutes knowledge in the knowledge base. Yet it is important for educational practitioners to know with what certainty, caveats and limitations they should take the results of educational R&D. This exceedingly important, but equally difficult, topic is not often the subject of discussion among knowledge-builders. Further, when raised, it is often dealt with in terms of the peer review process. Peer review is an important component of quality assurance; it is a necessary, but not sufficient condition with respect to assurance of the validity, replicability and scaled-up potential of micro-experimental educational innovations. And it is in this set of educational R&D where the quality of the results are particularly important. In terms of the improvement of the RD&D system, this is an area of special relevance for the NERPPB.

Among knowledge-builders, sponsors and policy-makers. The conversations among this group often tend to be about the wants and needs of their respective communities in absolute and particularistic terms. What problems should be attacked? What ideas should be tried? What resources should be committed to specific projects? It is a conversation periodically tinged with suspicion or skepticism. Such conversations focus less often on aggregate effort, strategic considerations and collaborative undertakings. Could there, for example, be a more collaborative effort to identify an integrated set of policy and knowledge-building goals with a set of specific objectives, resources and indicators of success? Under selective circumstances, there are periodic instances of such strategic planning in the United States about other topics, including those beyond national defense. The new GPRA framework provides some potential for that to occur, which moves in the direction of the creation of learning communities.

Between knowledge-builders and educational practitioners. In the definition section which follows, we undertake to define effective dissemination that necessarily focuses on the conversation between knowledge-builders and educational operators. Other reviewers have found much to criticize about that conversation, which we later record. Here, we wish to summarize a few key points about the dialogue.

From the practitioner perspective, the recurring central complaints focus on the transferability or inapplicability of the research and knowledge to practitioner operating conditions or the inaccessibility of the needed information. For those practitioners involved in comprehensive reforms, the fragmentation of the knowledge base is an added complaint. From the researcher perspective, the unfamiliarity of practitioners with research imperatives and the impenetrability of education's institutional structures complicates communications. This persistent problem raises questions about the present character of the dialogue, and ways that it might be changed for the better.

II. Definitional Issues

Having described some broad characteristics of the education RD&D system, it is time to return to some central definitional issues which contribute to the mapping of the enterprise. The way one structures these definitions shapes the direction one is likely to take in assessing the system and its results.

A. Basic Research Versus Applied Research

"A new drug or medical procedure requires enormous investments in applied research in preparation for a rigorous FDA approval process, but builds on basic research. A similar relationship between basic and applied research in education, leading to products of great benefit to children, could give all of education R&D the status and funding it deserves" (Slavin, 1997a).

Comparison among fields and disciplines about the distinctions between basic and applied research can sometimes lead to difficulties, and usually to arguments. Basic physics, the health sciences and medical practice, and education all start from somewhat different places in assessing what is basic versus what is applied research. Nonetheless, basic research is directed to a fundamental understanding of the phenomena (what is matter? what is cancer? how do people learn?) in a structured and replicable way; while applied research is directed to application of that knowledge to particular purposes (can we develop a new source of energy? is there a way to prevent cancer? how should teachers manage a class?).

Until the work began in earnest on cognitive science, most education research has been directed to the applied side. The National Research Council report of 1991 and other assessments point to the contributions now possible and being made by advances in basic cognitive science. It still remains the case that most education research is devoted to applied work, yet far from all desirable knowledge has been acquired, particularly in the area of applying basic research to classroom settings.

B. Research Versus Evaluation Versus Data Collection

In dealing with applied social science research, there is a tendency to treat research, evaluation and data collection as quite different things. Yet all three share much in common with respect to purpose, value and even techniques. All seek to provide valid information to guide action and future knowledge-building activities. While research may explore new ideas for future policies, evaluation assess current programs, and data collection document events and progress, all can broaden and deepen the knowledge-base about a given topic. Further, they often share methodologies in the production of quality results.

Thus, the distinctions among them may be important for some purposes, their common threads suggest that they be thought about in a comprehensive way when developing knowledge building strategies. (Morrill and Weiss, 1997).

C. Applied Research Versus Policy Research

Another somewhat vexing set of definitional distinctions center on applied versus policy research. The distinctions between them can be real, but the usual basis for making the distinction has more to do with issues of turf, nuance and politics.

Applied research and policy research may be genuinely different in that the applied educational work may affect the knowledge base or the operational practice of teachers without having an explicit or immediate connection with broader educational policy at any level, while all "policy research" is presumably undertaken at least in part to draw out the policy implications of the general knowledge base or some specific piece of applied research. This distinction, while real, is not usually what the conversation is about when the distinction is made. More often, the issues at stake in making the distinction have to do with whether the policy community is paying the slightest attention to the knowledge base in devising new policies, or whether the policy community is twisting the knowledge base to misrepresent its policy implications, or both.

The education community can be seen from other fields and disciplines as near obsessive about "politization" of education and educational research from both ends of the two perspectives described above. From an OERI perspective, the issue can be caricatured as "pure, but ignored" or "involved, but political." The interaction between research and policy is bound to produce some tensions, but in other venues, sorting evidence from conviction can be dealt with in sound ways and less emotional environments (Morrill and Weiss, 1997). This is a matter to which the project will return in later papers.

D. Knowledge-Building – The Standards of Evidence

According to Shavelson (1988), the "truth test" or whether the research is trustworthy, will play an important role when attempting to change the ways that policymakers conceptionalize an issue. The "utility test" or whether the research provides direction to the agency for current practice or alternative approaches, should also be applied.

Sroufe (1997) argues that there are not enough studies done which are of high enough quality to influence national education policy. He cites a 1997 GAO report which examined hundreds of studies and found that only 22 were satisfactory. Many of the others did not have a suitable comparison group, and none used a nationally representative sample.

The difficulty of the definitional issues described above also hinges on the standards of evidence implicitly or explicitly being used to assess the quality of knowledge, the confidence with which one can act upon research findings, or the minimum standards upon which any action will seem warranted. The social science community tends to take refuge in the peer review processes employed in other sciences as a guarantor of research quality. While such processes have substantial strength and few easy alternatives in most applications, the standards of evidence between disciplines in the social sciences are quite different, much less the differences which no doubt exist among the policy, practitioner and other lay communities and the research community.

This is not to suggest that there is only a single standard which should be uniformly applied, but rather to suggest that there needs to be: (1) clarity as to what standards are being applied; and (2) where along a spectrum from unambiguous outcomes from random selection experimentation through compelling correlations to "clinical" conviction, the standard of evidence is to be set. This selection should be made in the context of certainty that the ultimate standards are unavailable in all circumstances for reasons of cost, time, and moral imperatives.

E. Dissemination – What Constitutes Effectiveness?

Above, we discussed reasons for the perceived failure of the educational dissemination system. Discussions of the failure of the system rely on ideas about what the ultimate goals of a dissemination should be, and what are reasonable expectations of such a dissemination system. Here, we address the issues of what a dissemination system should look like, what may be reasonable expectations for such a system, and what should be the ultimate goals.

According to Klein (1992), there are five important components of a good national education dissemination system, some of which do not exist. These are:

- Education resources: strategies to identify and disseminate the highest quality resources in each of the following categories do not exist. There are many interaction effects between the knowledge and the vehicle chosen (Klein and Gwaltney, 1991).
    - products such as texbooks and videos, instructional or management programs,
    - educational practices or principles used in classrooms,
    - public policies which are focused toward the accomplished of particular organizational goals, and
    - public information activities such as the sharing of research and statistics.
- dissemination functions:
    - spread, the one-way distribution of information aimed at increasing awareness. This is the most common type of dissemination used by the Department of Education, and is usually performed by different offices and programs. While the Departement of Education does review these activities, there is no system to identify which materials should be spread to which users, which functions may fill a need, and which may be most cost effective.
    - choice, the dissemination of information on different options, often carried out by libraries, clearinghouses, referral or information centers, data bases, and catalogs. ERIC does not include computer software, audiovisual materials, expert referrals, and most books. Nor does ERIC aid users in identifying effective resources or choosing between various resources.
    - exchange, the flow of information in many directions through the use of such tools as forums, site visits or meetings. Additionally, there are ED sponsored teleconferences and computer networks. There has not been

much emphasis on aiding users sharing exemplary resources or evaluating their own resources.

  - implementation, the use of knowledge which includes technical assistance or training. This is the focus of OERI's regional laboratories. This should not only include the replication of effective practices, but also the improvement of capacity and effectiveness through training schools to use research and solve problems (Klein and Gwaltney, 1991). Hawley (1990) asserts that implementing agencies usually must be provided with technical assistance and training models to ensure adoption and implementation of even the most promising researched ideas.

- Bureaucratic governance levels: coordination among these different levels is very limited.

  - federal
  - regional-multistate
  - state
  - intermediate
  - local district
  - school
  - community

- Content and population focus: Louis (1992) argues that this structure has led to competition between the two different types of disseminating units. The system is complex and disorganized. Therefore, users have experienced great confusion in where to go for assistance.

  - multifocus, such as the Educational Resources Information Center system (ERIC) and the Regional Educational Labs.
  - categorical programs, such as the dissemination activities which are part of the special, vocation, and bilingual programs. Many of these programs have identical dissemination functions, but they do not coordinate their dissemination or learn from each others' experiences.

- Dissemination roles and skills:

  - librarians
  - technical assistance providers or trainers
  - publishers
  - media producers

What is the ultimate goal of the educational dissemination system? We would argue that efforts aimed at supporting school improvement through the dissemination of new information (including the provision of technical assistance in its use) must be judged by their ability to demonstrate the effective use of that information in real school settings. Justification for Federal support of dissemination efforts, if they do not lead to changes in services to populations of interest to Federal education programs, is weak at best.

Table 5

KLEIN'S AND GWALTNEY'S EXAMPLES OF DISSEMINATION FUNCTIONS

Dissemination Function	**Examples of General or Multi-PurposeDissemination Efforts**					**Examples of Special-Purpose Dissemination Efforts**		**Potential Dissemination Efforts**
	ERIC	**Regional labs**	**R&D centers**	**ED Research Library and related services**	**ED pubs, Other services**	**Chapter 1 Technical Assistance Centers**	**OSERS Projects Clearinghouses**	**Treasure Chest**
Spread	ERIC** Digests Monographs Newsletters	Products Info packages Newsletters	Synthesis products Research reports Other products	Distribute OERI pubs OERI computer Bulletin Board	A wide variety of pubs Press releases Briefings Radio spots			Public information
Choice	ERIC databases Referral services Training in use of database	Clearinghouse functions Identification of Exemplary Programs		Management Info Systems Library Search services	Some pubs focus on alternatives	Some clearinghouses	Clearinghouses Regional Resource Centers	Use computers to describe treasures
Exchange	Conferences User contributions to info products Advisory Boards	Conferences Needs assessment R&D field testing	R&D field testing		ED forums Conferences		Special-net Regional Resource Centers Research Institutes Technical assist. centers	Obtain evaluations of treasures
Implementation							Demonstrations Training Other Programs Technical assistance centers	Provide support to encourage use of exemplary treasures

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As described above, Federal programs in education use various dissemination approaches to provide information about new research knowledge, about new approaches derived from effective practices, or about new (Federal) program initiatives, requirements, etc. Although Federal support for research should not be conditioned solely upon demonstrations of effectiveness (the null finding is frequently knowledge gained), and Federal approaches to identifying effective practices will not always identify initially only those that are effective, Federal dissemination efforts should be supported only if they disseminate information demonstrated to have resulted in effective practice – effectiveness being related to demonstration of improved results for children or more cost-effective approaches to achieving similar results – and the dissemination approaches have been demonstrated to have resulted in effective knowledge use.

While restrictive at first glance, this criterion can be thought of in comparative ways. Would we tolerate the Department of Health and Human Services' use of its dissemination funds to support the widespread distribution of information about untested surgical practices, or dietary supplements, or any of a host of health practices that would be analogous to disseminating information about unproved education practices? Or would it be appropriate for the Department of Transportation to disseminate information about new untested theories of how to land commercial aircraft, or of appropriate air traffic control practices?

Further, would we accept these agencies using approaches to the demonstration of their proven information that lets it sit on library shelves, or that doesn't tell the user how to apply it in their clinical practices? In fact, these agencies use the most sophisticated social marketing techniques developed to change consumer behavior (how many of us have changed our dietary, smoking, or exercise patterns over the past two decades based on these campaigns) or to change clinical practice.

While these analogies to other federally funded public activities are instructive, it must be acknowledged that education research is fundamentally different, and perhaps more difficult than these other fields. Effectiveness of an educational practice is very difficult to demonstrate. In order to test the effectiveness of a new teaching methodology or classroom setting, a controlled experiment must be devised. Students must be randomly assigned to a classroom with the new system or without, samples must be large enough, and students should not be aware that they are being placed in a different setting as part of such an experiment. Such conditions are usually very difficult to fulfill, as while we are conducting such an experiment, we are also affecting students' lives. If it appears, mid-experiment, that a student would be better served in another setting, it is problematic to continue with the initial randomized design. Therefore, such conditions are rarely realized.

Even when such controlled experiments are adhered to and practices are shown to be effective, implementation is complicated. As alluded to in the previous point, the educational setting is very important. While a particular program may prove effective with certain types of students, teachers, and schools, it may not be effective in a different setting or scale. When finding that a program or practice is effective, the limitations as well as the potential need to be explicit and understood.

The status of the field of education research means that it needs to be seen in developmental terms. While the educational dissemination system should concentrate on the practices and programs that have been proven effective by the most rigorous standards, it should continue to identify promising potential programs which are proven to work in specific circumstances, and develop trials for more extensive and conclusive testing.

III. Planning and Execution of Education RD&D

In this and subsequent sections, we undertake to restructure the information and opinion provided in the first section around a more conventional structure of analysis starting with an overall view of the system. In this section, we first present some broad views held by others, and then provide a summarization of the points in the first section concerning the planning and execution of federal education RD&D. In succeeding sections, we continue with such summaries about related topics.

A. Views of Others

Some analysts find other functional models such as the agricultural extension service to hold promise for education. According to Rogers (1992), the important characteristics of such a system would include:

- Control and participation in the system by the teachers,
- A focus of research on user problems and needs,
- The ability to move information both from the researchers to the practitioners and from the practitioners to the researchers. Louis (1992) also argues that communication must go in both directions.
- Flexibility to respond to changes in needs and environments,
- Sensitivity to the organization structure of the U.S. education system. According to Louis (1992), "the idea that school development and knowledge use are intertwined has not been well incorporated into educational dissemination policy."
- Evaluation of educational innovations (because effects will not be as transparent as in agriculture).
- Individuals who would be responsible for translating the knowledge into a form appropriate for the users, and
- Sufficient funding for at least 20 years. Klein (1992b) also argues that a 20-year federal commitment would aid in the development of a national dissemination system by avoiding political battles. James (1992) also finds problems with education research's small scale, short term, disjointed studies.

Other analysts have focused most heavily on the dissemination system as a key area of needed improvement. According to Klein (1992a), there are three goals that a new education dissemination system should work towards. First, the system should aid users in understanding the value and importance of different education tools so that the practitioners will use those resources which are most likely to improve education. "A nationwide education dissemination system will strive to make up-to-date information about high quality resources readily accessible and therefore directly serve educators' information needs." The current system does not disseminate information on the large majority of educational knowledge, and does not aid the users in determining which programs, products, practices, and policies will be most useful for their particular needs. The second goal is to involve researchers, developers, practitioners, and users in all dissemination functions. The third goal is the development of a "dissemination-driven RD&D system."

Still other analysts concentrate on resources, distributions and process. Hawley (1990) states that OERI should spend about 30 percent of its budget on basic research and 20 percent on field-initiated proposals. OERI should improve the peer review process and ensure that all of the reviewers have sufficient technical knowhow. There should be legislation that requires OERI to utilize peer review in the award of most OERI funds. Missions of research centers should be defined broadly and contract awards should be made based on the proposed research's quality, not its adherence to prescribed research questions. OERI staff should review center work. OERI-funded laboratories should not be prohibited from conducting research. OERI should make the amount of funds awarded based on quality of research proposals. Centers should not be limited to 5-year awards, but should allow research to extend over longer periods of time, during which other contractors could challenge the incumbent center. OERI and the Secretary should be clearer about national priorities for education research and discussion on these priorities should be cultivated.

B. Summary of Issues

A review of planning and execution of the education RD&D system would suggest that:

- The planning of the educational RD&D is fragmented and partial at most, in both a formal and informal sense. While a formal comprehensive structure may be neither feasible or desirable, an informal collaborative structure has real potential for improved outcomes, particularly if creatively coupled with GPRA requirements.

- The aggregate spending on educational RD&D is probably substantially less than optimum by comparison with any other major activity in the society, perhaps by a factor of two or more. Recognition of this deficiency alone will, however, be unlikely to result in more resources absent good research ideas, some reform of the RD&D system, and more confidence that the results will be better than in the past.

- There are sufficient reasons to at least question, if not change, the distributions of educational R&D resources along several dimensions. Basic research appears to be underfunded relative to applied. The content focus of the research appears too heavy on peripheral issues and too light on critical matters of curriculum and learning. And there appears to be too much emphasis on research about micro innovation and too little on validity and scale-up of promising practice.

- There also appears to be adequate grounds for concern about the distribution between R&D on the one hand and dissemination on the other. These concerns are two fold. First, the balance appears to be tilted too heavily toward dissemination (though numbers are hard to come by). Second, there is substantial reason to worry about the quality and effectiveness of the dissemination system. At least for the dissemination of information about comprehensive reform, an essentially reactive system appears inadequate to the task. The appearance of intermediary organizations raises the possibility of a new, more effective model.

- There are good reasons to worry about the incentive structure to support quality educational RD&D, but no obvious quick fixes.

- The availability of comprehensive information about the resources in the national education RD&D system is appallingly weak.

IV. Methodological Issues

The major methodological issues that have been identified in our review of the existing system are two: standards of evidence and characteristics of the applied research program. They are interrelated.

As pointed out in the definitional issue section above, there are no commonly understood and accepted standards of evidence for assessing the validity of educational innovations and improvements. A number of research articles and the September 1997 committee workshop call attention to this issue. Some, such as Robert Slavin, would push for sharp change to the point of creating an entity like the Federal Drug Administration which would rigorously test and validate innovative educational models before they could be advertised as successful or effective.

Whether one takes quality assurance to that level of regulation or not, the absence of any clear standards and identification of research validity leaves practitioners prey to faddism and disappointment. Until there is some approach to disciplining the research community and informing the practitioners, it is unlikely that the full potential value of competent research results will be realized, including the desired sophistication of the sponsor and policy-making communities to recognize and demand quality research. It should be clear that this is not solely a demand for comparison group demonstration and evaluation, though more of that is surely needed. But it is a demand for more realism and disclosure about the limitations as well as the promise of micro-experimentation.

The second and related issue is the distribution of applied research among theoretical, micro-experimentation and large scale trials. As noted in the September 1997 workshop, the sponsorship of large scale trials has shifted away from the federal government as sponsor. While sponsorship is a separable matter, the quantity of large scale trials with accompanying rigorous evaluation appears to be shrinking, while the need may be rising. Further, the absence of federal sponsorship of the research and evaluation concerning such trials puts a heavy load on foundation funding.

V. Governance Issues

The structure of the oversight, direction and conduct of education RD&D, as described earlier, is exquisitely complex, and, with respect to the U.S. Department of Education, minutely prescribed in statute. The institutional scene is (not surprisingly) a reflection of the accumulation of many years of battles among the forces and interested stakeholders in the educational field. All of these conditions make adjustments in the status quo daunting undertakings. Nonetheless, there are reasons to raise questions about the effectiveness or utility of the present governance structures, capacities and processes. In particular, there appear to be a variety of mismatches between goals and expectations on the one hand and jurisdictions and capacities on the other.

- The goals or expectations for a national focus in the federal structure (Department of Education, OERI and/or NERPPB) are not matched well with the resources or authority to exercise that kind of national leadership in any formal sense. Further, though research and information have been recognized for many years as appropriate federal functions, the political controversies in education serve to limit the scope of action in these long-standing functions. For example, the equally long-standing concern about federal involvement in curriculum may well be part of the reason for under-investment in this critical educational research priority.
- The mission statements for the national institutes and the regional laboratories are broad and expansive, while their staffing and financial resources are limited, and in some cases, declining. Within the federal staffing parameters, there appears to be very little way to produce "critical mass"; and external funding budgets are comparably small and inadequate for the purpose of producing national leadership on issues. At most, the institutes and labs have modest capacity to conduct their own work, and therefore must be primarily involved with sponsoring, assisting or disseminating the work of others.

- If more major trials were to be desired on the part of the federal government, the present OERI budgets—and potentially the staffing capacity—would not be able to mount the effort. The budgets for such work would likely come, in any event, from programmatic funds. These circumstances require a closer collaboration between OERI/NERPPB, and the rest of the Department, if the former are to play an important role in research strategy.

- While the resources and coordination efforts may prevent duplication of effort, the expectations, goals and mission statements between and among the institutes and regional labs do overlap.

- The broadness and overlap in the mission statements suggest a reluctance to establish true priorities rather than a "something for everyone" philosophy, which can be substantially debilitating when budgets are limited.

- The institutional separation between the technical assistance organizations and the dissemination structure complicates the effectiveness of dissemination, particularly if more hands-on assistance is required to produce comprehensive reform.

VI. Integration of the Map

The foregoing descriptive analysis of the existing education RD&D system provides a large array of issues across the full spectrum of the system from its planning, resources, structure, processes and selection of priorities to its long history of tinkering with organizational structure, complexity and resistance to fundamental change in direction. The map suggests important connections among the component issues and a rapidly escalating set of difficulties and controversy as the issue agenda expands. Given these trade-offs, there would appear to be three different approaches available for the committee's ultimate report.

- *Comprehensive and explicit.* Under this approach, the full range of issues herein identified and perhaps others would be directly treated with explicit recommendations made about each.

- *Comprehensive and directional.* Under this approach, most if not all of the issues herein would be identified (and perhaps others), but rather than explicit remedial recommendations in every case, the direction of remediation would be indicated, with selective recommendations when the committee sees fit to do so.

- *Selective and explicit.* Under this approach, several areas of concern would be selected for detailed treatment with explicit remedial recommendations made about the selected topics.

While all three approaches are plausible, we are, subject to discussion and determination by the sponsors, attracted to the middle course.

REFERENCES

Bick, K., & Jackson, G.B. (1994). Research and Educational Reform: A Study of the Federal Role in the United States' Educational Research and Development. In Tomlinson & a.C. Tuijnman (Eds.), *Educational Research and Reform: An International Perspective* (pp. 69-79). Washington, DC: OERI and OECD.

Biddle, B.J. (1996). Better Ideas: Expanded Funding for Educational Research. *Educational Researcher,* 25(9), 12-14.

Hatton, M. (1997). Information on staffing at National Institutes (email).

Hawley, W.D. (1990). Enhancing the Federal Government's Capacity to Support the Improvement of Education Through Research and Development. *Educational Researcher,* 17-22.

House, E.R, Haug, C., & Norris, N. (1995). *Evaluation Policies and Issues in the National Science Foundation.* Boulder, CO: University of Colorado School of Education.

James, T. (1992). A Different Angle on Research Funding Policy. *Educational Researcher*, 25-28.

Kennedy, M.M. (1997). The Connection Between Research and Practice. *Educational Researcher*, 26(7), 4-12.

Klein, S. S. (1990). How Can the Federal Government Help Education-Related Clearinghouses? *Knowledge and Society: The International Journal of Knowledge Transfer,* 3(2), 26-44.

Klein, S. S. (1992a). A Framework for Redesigning an R&D-Based National Education Dissemination System in the United States. *Knowledge: Creation, Diffusion, Utilization,* 13(3), 256-286.

Klein, S. S. (1992b). Tilling Fertile Soil: Principles to Guide Transplants from Agriculture to Education Dissemination. *Knowledge: Creation, Diffusion, Utilization,* 13(3), 330-348.

Klein, S.S. (Ed.). (1993). Special Feature. Sharing the Best: Finding Better Ways for the Federal Government to Use Evaluation to Guide the Dissemination of Promising and Exemplary Education Solutions. *Evaluation and Program Planning,* 16(3), 209-278.

Klein, S.S., and Gwaltney, M.K. (1991). Charting the Education Dissemination System: Where We are and Where We Go From Here. *Knowledge: Creation, Diffusion, Utilization,* 12(3), 241-265.

Louis, K.S. (1992). Comparative Perspectives on Dissemination and Knowledge Use Policies: Supporting School Improvement. *Knowledge: Creation, Diffusion, Utilization,* 13(3), 287-304.

McCarthy, M. (1990). University-Based Policy Centers: New Actors in the Education Policy Arena. *Educational Researcher,* 25-29.

Miles, M.B. & Haughey, C.F. (1992). The Leadership Role of the U.S. Department of Education in Creating and Supporting a National Education Dissemination System. *Knowledge: Creation, Diffusion, Utilization,* 13(3), 241-247.

Morrill, W.A. and Weiss, H.B. (1997). *Talent, Tensions and Transition, An Organizational Analysis of the Planning and Evaluation Service*, U.S. Department of Education, unpublished report.

Moskowitz, J. and Kirkpatrick, S. (1995). *The Governance Institute as a Research Facilitator.* Pelavin Research Institute, Washington, DC.

Murnane, R.J. and Levy, F. (1996). *Teaching the New Basic Skills.* The Free Press.

National Research Council (1995). *Feasibility Study for a Strategic Education Research Program*, Unpublished Paper.

OERI (1996). *Profiles of the Regional Educational Laboratories.*

Online (1996). New National Education Research and Development Centers.

Pelavin Research Institute (1994a). *Establishing National Research Institutes.* Washington, D.C.

Pelavin Research Institute (1994b). *A Vision for OERI's Program of Research and Service, Draft Report.* Washington, D.C.

Rogers, E.M. (1992). Prospectus for a Cooperative Extension System in Education. *Knowledge: Creation Diffusion, Utilization,* 13(3), 248-255.

Shavelson, R.J. (1988). Contributions of Educational Research to Policy and Practice; Constructing, Challenging, Changing Cognition. *Educational Researcher,* 17(7), 4-11,22.

Slavin, R.E. (1997a). Design Competitions: A Proposal for a New Federal Role in Educational Research and Development. *Educational Researcher,* 26(1), 22-28.

Slavin, R.E. (1997b). Design Competitions and Expert Panels: Similar Objectives, Very Different Paths. *Educational Researcher,* 26(6), 21-22.

Sroufe, G.E. (1997). Improving the "Awful Reputation" of Education Research. *Educational Researcher*, 26(7), 26-28.

U.S. Department of Education (1989). *The President's Fiscal Year 1990 Budget for the Office of Educational Research and Improvement.* Nashville, TN.

U.S. Department of Education (1995). Summary of Research and Demonstration Programs.

U.S. Department of Education (1996). NCES, Digest of Education Statistics, 96-133, by Thomas D. Snyder.

U.S. Department of Education (1997). *Justifications of Appropriation Estimates to the Congress.*

U.S. General Accounting Office (1997). *Head Start: Research Provides Little Information on Impact of Current Program.* Washington, DC.

Vinovskis, M.A. (1996). The Changing Role of the Federal Government in Educational Research and Statistics. *History of Education Quarterly* 36(2), 110-128.

Vinovskis, M.A. (1997). *Changing Federal Strategies for Supporting Educational Research, Development, and Statistics.* Background paper prepared for OERI's National Education Research Policy and Priorities Board.

Wagner, J. (1997). The Unavoidable Intervention of Educational Research: A Framework for Reconsidering Researcher-Practitioner Cooperation. *Educational Researcher,* 26(7), 13-22.

White, B.F. (1990, April). *Some Thoughts on Improving the Coordination of Education Dissemination Efforts.* Paper presented at the Annual Meeting of the Knowledge Utilization Society, Bethesda, MD.

Table A-1

DEPARTMENT OF EDUCATION RESEARCH FUNDING

General Authority Funding			
Name	Description	FY 1995 Funding	FY 1996 Funding
Educational Research, Development, Dissemination, and Improvement Act	Authorizes the research, development, demonstration, evaluation, dissemination, and technical assistance activities of the Office of Educational Research and Improvement aimed at expanding fundamental knowledge of education and promoting the use of research and development findings in the design of efforts to improve education. Included are authorities for five national research institutes and the national education dissemination system.	$86.2M	$97.6M
Rehabilitation Act, Title II, Research and Training	Authorizes the National Institution on Disability and Rehabilitation Research (NIDRR) to support research, development, demonstration, and dissemination activities that seek to improve the lives of persons of all ages with disabilities, including those with the most significant disabilities.	$70.0M	$70.0M
Elementary and Secondary Education Act, Title X, Part A, Fund for the Improvement of Education	Authorizes support for nationally significant programs and projects to improve the quality of elementary and secondary education. These include development, demonstration, evaluation, and dissemination activities.	$36.7M	$36.7M
Higher Education Act, Title X, Postsecondary Improvement Programs	Authorizes the Fund for the Improvement of Postsecondary Education (FIPSE) to support demonstrations of exemplary, locally developed projects that encourage innovative reform and improvement of postsecondary education.	$17.5M	$17.5M
General Education Provisions Act, Part D, Section 422	Requires the Secretary to collect data and information to obtain objective measures of the effectiveness of programs. Program administration funds may be used pursuant to this authority.	$3.4M	$3.2M
TOTAL		$213.8M	$225M

Source: U.S. Department of Education, 1995.

Authorities that Support Major Department Programs

Name	Description	FY 1995 Funding	FY 1996 Funding
Goals 2000: Educate America Act, Title III	Authorizes under sections 219, 220, 221, 313, and 314 research, development, demonstration, dissemination, evaluation, and technical assistance activities regarding challenging standards and systemic education improvement.	$0	$46.5M
Elementary and Secondary Education Act, Title I, Helping Disadvantaged Children Meet High Standards	Includes authority under part E for evaluations of Title I programs and demonstration of projects that show the most promise of enabling children served under Title I to meet challenging State content and student performance standards.	$3.7M $0	$11.0M $25.1M
Elementary and Secondary Education Act, Title II, Dwight D. Eisenhower Professional Development Program	Includes broad authority under part A for Federal activities including demonstrations, dissemination, and evaluations of activities carried out under both the Federal and State Eisenhower programs as well as authority under part C for a specific professional development demonstration project.	$21.4M $0	$32.0M $3.0M
Elementary and Secondary Education Act, Title IV, Safe and Drug-Free Schools and Communities	Includes authority under subpart 2 of part A for rigorously evaluated demonstrations of innovative approaches to drug and violence prevention, development and dissemination of model curricula and other drug and violence prevention information and materials, and evaluation of drug and violence prevention programs.	$25.0M	$35.0M
Elementary and Secondary Education Act, Title VII, Bilingual Education, Language Enhancement, and Language Acquisition Programs	Includes authority under subpart 2 of part A for research and evaluation, for projects to disseminate information on successful bilingual models, and for a national clearinghouse for bilingual education.	$7.1M	$7.3M
Elementary and Secondary Education Act, Title IX, Part A, Indian Education	Includes authority under subpart 4 for research related to effective approaches for the education of Indian children and adults and for evaluation of federally assisted education programs from which Indian children and adults may benefit.	$2.0M	$7.5M
Elementary and Secondary Education Act, Title XIV, General Provisions	Includes authority under part G for the Secretary to reserve funds from amounts appropriated for various ESEA programs (other than those in Title I) to carry out comprehensive evaluations of categorical programs and demonstration projects and studies of program effectiveness.		

Authorities that Support Major Department Programs

Name	Description	FY 1995 Funding	FY 1996 Funding
Individuals with Disabilities Education Act	The authorizations for many programs under this Act will be expiring at the end of 1995, and new legislation has been proposed that would extend the current discretionary programs through 1996. Many of the current, discretionary, special purpose programs under parts C, D, E, F, and G include authority for research, demonstration, dissemination, and evaluation activities, as well as training and technical assistance activities.	$100.0M est.	$100.0M est.
Carl D. Perkins Vocational and Applied Technology Education Act	Includes authority under title IV for various research, development, demonstration, and dissemination programs. For FY 1996 the President requested a total of $37.0 for a consolidated national program authority.	$6.9M	$37.0M
Adult Education Act	Includes authority for a variety of research, development, and evaluation activities. For FY 1996 the President requested a total of $11.0M for a new adult education and family literacy national program authority, which would include funds for research, evaluation, technical assistance, and continued support of the National Institute for Literacy.	$7.6M	$11.0M
School-to-Work Opportunities Act	Includes authority under Title IV for the Secretaries of Education and Labor to conduct a number of national activities that support the work being carried out by States and localities. These include the mandated collection and dissemination of specific information, as well as a national evaluation, research, and demonstration activities.	$6.9M	$15.0M
Higher Education Act, Title IV, Part A	Includes authority under section 402H for evaluations of Federal TRIO programs, which provide postsecondary education outreach and support services designed to encourage qualified individuals from disadvantaged backgrounds to enter and complete college or to be prepared for doctoral studies.	$1.5M	$1.5M
Rehabilitation Act	Includes authority under section 14 for evaluation of programs authorized under the Act.	$1.6M	$1.6M
TOTAL		183.7	180.9

Source: U.S. Department of Education, 1995.

Other Categorical Authorities

Name	Description	FY 1995 Funding	FY 1996 Funding
Elementary and Secondary Education Act, Title III, Technology for Education	Includes authority under section 3122 for Federal leadership in the use of technology in education, including research, development, demonstration, evaluation, and dissemination activities and authority under section 3136 for challenge grants to support development and demonstration of new applications of technology to education; authority under part B for star schools demonstrations of distance education programs; authority under part C for development and distribution of educational and instructional video programming for preschool and elementary school children and their parents; and authority under part D for a telecommunications demonstration project for mathematics.		
Elementary and Secondary Education Act, Title V, Promoting Equity	Includes authority under part B for developing innovative strategies and model training programs in gender equity for teachers and other school personnel and the development of policies and programs to address and prevent sexual harassment. Also includes authority under part C for dropout prevention demonstrations and for a national evaluation of the demonstration programs.	$1.7M $12.0M	$1.7M $0
Elementary and Secondary Education Act, Title X, Part B, Gifted and Talented Education	Authorizes support for model projects designed to help educators identify and meet the special educational needs of gifted and talented students and, where appropriate, to adapt strategies successful with those students to improve instruction for all students, as well as support for a national center to conduct research, dissemination, and evaluation activities.	$4.9M	$9.5M
Elementary and Secondary Education Act, Title X, Part C, Public Charter Schools	Authorizes support of charter schools, an evaluation of the impact of charter schools on student achievement, the development and dissemination of model State charter school laws and model contracts, and the dissemination of information on successful charter schools.	$6.0M	$20.0M
Elementary and Secondary Education Act, Title XIII, Part B, National Diffusion Network	Authorizes activities to identify and disseminate effective and promising programs and practices.	$11.8M	$14.5M
Higher Education Act, Title VI, International Education Programs	Includes authority for research and development of instructional programs in international studies and foreign language, including development of more effective teaching methods, standardized measures of competency, and specialized curriculum materials.	$23.3M	$23.8M
Education of the Deaf Act	Includes authority for Gallaudet University and the National Technical Institute for the Deaf (NTID) to carry out research activities.	$5.8M	$6.0M

Other Categorical Authorities			
Name	Description	FY 1995 Funding	FY 1996 Funding
Act to Promote the Education of the Blind	Includes authority for the American Printing House for the Blind (APH) to develop and distribute educational materials adapted for use by blind students in educational programs below the college level.	$0.5M	$0.5M
20 U.S.C., 123, Howard University	Authorizes research activities at Howard University, including post-doctoral fellowships, primarily in scientific disciplines, the purchase of laboratory equipment, laboratory renovation, and multidisciplinary research projects.	$4.6M	$4.6M
TOTAL		$58.6M	$80.6M

Source: U.S. Department of Education, 1995.

Table A-2

FOUNDATION FUNDING OF EDUCATION RESEARCH AND DEVELOPMENT

Foundation	**Amount Paid (1996) (million $)**
Annenberg Foundation	20.2
Carnegie Corporation	12.7
DeWitt Wallace	2.1
Ford Foundation	20.3
IBM International Foundation	11.0
MacArthur Foundation	3.2
Andrew Mellon Foundation	16.2
James McDonnell Foundation	5.2
Pew Charitable Trust	12.8
Spencer Foundation	15.5
Rockefeller Foundation	11.0
TOTAL	130.2

Table A-3

INITIATIVES OF FOUNDATIONS TO IMPROVE EDUCATION

Initiatives of Foundations to Improve Education[1]			
Foundation	Designated Program Area	Initiatives/Focus	Funding Level[2]
Walter Annenberg	School Improvement	Annenberg National Institute for School Reform at Brown University	$50,000,000[3]
		New American Schools Development Corporation	$50,000,000[3]
		Education Commission of the States: disseminate work of NASDC's design teams	$15,000,000[3]
		Annenberg Institute: electronically link public schools	$5,000,000[3]
AT&T	Restructuring	New American Schools Development Corporation	$1,000,000[4]
	Teacher Education	Teachers for Tomorrow: Collaboration to redesign teacher education in five cities	$787,335[3]
BellSouth	Supporting Educators to Meet Changing Student Needs	New approaches to teacher education; creative teaching opportunities; support for leadership development; and support for comprehensive services for students and families	$1,704,500
	Linking Educational Policy with Changing Regional Needs	Expand scope of public education; enhance public support for education, strengthen education governing bodies; and improve accountability and assessment of students, teachers, and systems	$852,000
	Encouraging Educational Advanced Through Information Technology	Promote information technology studies and expand information technology	$820,000
Carnegie Corporation	Education and Healthy Development of Children and Youth	Improve quality of early childhood education	$3,212,972
		Improve educational achievement and health of at-risk adolescents – Middle Grade School State Policy Initiatives	$8,455,506 $2,031,000[5]
		Education reform including support for the National Board of Professional Teaching Standards	$4,424,000
		Science education – American Association for the Advancement of Science: Reformulate content of math, science, and technology education	$2,213,000 $750,000[5]

Initiatives of Foundations to Improve Education[1]			
Foundation	Designated Program Area	Initiatives/Focus	Funding Level[2]
Annie Casey	Increasing Public Awareness	Information dissemination	$4,286,929
	Program Demonstrations and Policy Research	Comprehensive systemic reform in juvenile justice system, adolescent health, and education	$2,457,030
	Long-Term Comprehensive Reform	New Futures Initiative: Collaborative partnership to improve planning and services to at-risk youth and their families: Bridgeport, Dayton, Little Rock, Pittsburgh and Savannah	$8,981,500
Chicago Community Trust	Children, Youth, and Families Initiative	Coordinate and expand families' access to social and recreational services, 10-year project	$30,000,000[4]
Edna McConnell Clark	Program for Disadvantaged Youth	Urban middle school reform to improve student achievement. Five districts and 12 schools participate in the program	$5,296,041[6]
Commonwealth Fund	Developing Capacities of Young People – School-to-Work Transition Programs	Manpower Development Research Corporation: Assess knowledge about existing school-to-work transition programs in 15 communities	$400,000[4]
Danforth	A Good Beginning for Every Child	Early childhood education, development of parenting skills, and professional staff development of early childhood and primary school personnel	$446,942
	School, Family, and Community Partnerships	Collaboration to assure comprehensive services to students and families in need	$1,019,942
	Leadership for Schools	Professional development programs	$2,525,428
Exxon Education	Mathematics Education Program	Improve mathematics instruction in grades K-3 through the use of math specialists	$9,200,000
	Elementary and Secondary School Improvement Program	School restructuring and teacher preparation – New American Schools Development Corporation	$3,000,000

Initiatives of Foundations to Improve Education[1]

Foundation	Designated Program Area	Initiatives/Focus	Funding Level[2]
Ford	Urban Poverty: Children, Youth, and Families	Early childhood, employment, and training opportunities for low-income youth	$46,305,452
	Broaden Educational Opportunities for Disadvantaged Students	QUASAR (Quantitative understanding: Amplifying Student Achievement and Reasoning): National demonstration project in middle school mathematics	$3,600,000
		Equity 2000: National demonstration project in mathematics, focusing on algebra and geometry	$1,500,000
		Urban Partnership Program: Access to higher education for at-risk youth	$870,800
Knight	Excellence in Education	Collaboration between local schools and colleges to enhance school reform	$2,400,000
	Special National Opportunities in Education	Cities in Schools Experiments in for-profit school management	$2,650,921
Lilly Endowment (IN)[7]	Education and Youth	Teaching and learning; student access to higher education; public support for education including school reform and parent involvement; and education governance	$31,000,000
MacArthur	Education Policy	Better Education through Informed Legislation Project: National Council of State Legislators – develop and implement education reform	$175,000
	Development of Education Standards and Assessment of Measures	New Standards Project: Student assessment that relies on nontraditional testing methods – National Center on Education and the Economy	$3,000,000
		Research and evaluation on New Standards Project's implementation and impact – Consortium for Policy Research in Education, Rutgers University	$225,000
		Patterns of Thinking Project for research at Harvard University on thinking dispositions and creative thinking	$300,000
Marin Community Foundation: Buck Trust[7]	Education and Training	School restructuring and redesign, drop out prevention, literacy and basic skills, and life-long learning	$3,300,000
James S. McDonnell	Cognitive, behavioral, and social sciences research to improve curricula, learning, teaching and teacher training	Cognitive Studies for Educational Practice Project: Collaboration to develop theory-based instructional prototypes that address K-12 instructional problems	$7,400,000[8]

Initiatives of Foundations to Improve Education[1]			
Foundation	Designated Program Area	Initiatives/Focus	Funding Level[2]
Andrew W. Mellon	Project 2061	Nationwide project of the American Association for the Advancement of Science to improve scientific literacy or students	$750,000
	Critical Thinking	Learning Research and Development Center, University of Pittsburgh to examine educational applications of research on varieties of reasoning	$940,000
Charles Stewart Mott	Poverty – Children, Youth and Families	Families and Early Childhood; Teenage Pregnancy Prevention; Youth Service and Employment	$735,255 $861,072 $1,919,227
	– Education	Historically and Predominantly Black Colleges and Universities School/Community Initiatives School-to-Work Transition Systems Redesign and Equity for activities involving education reform, collaborative models, and program evaluation	$222,758 $2,667,851 $675,000 $1,094,994
Panasonic	School Reform Partnership Program	Reform efforts in nine urban school districts	$594,400[9]
William Penn (PA)[7]	Transitioning Adolescents to Adult Life	Minorities in Higher Education Summer Youth Employment/Career Exploration Teenage Pregnancy Prevention	$6,528,984 $1,014,269 $2,392,610
Pew Charitable Trusts	Education Restructuring	New Standards Project: student assessment PATHS/PRISM, Philadelphia Partnership for Education: middle school restructuring Philadelphia Schools Collaborative	$5,500,000 $2,400,000 $7,820,000
	Teachers and Teaching	Improve undergraduate teaching and increase the number of minority faculty in higher education	$896,300
	Access and Success in Higher Education	Increase number of disadvantaged students completing high school and transitioning to postsecondary education	$7,760,000
Rockefeller Foundation	At-Risk Youth	Equity 2000	$2,000,000
Rockefeller Brothers	Education	Minority recruitment and training programs, early childhood teacher education training programs, and support for special teacher education programs	$854,070
San Francisco (CA)[7]	Education	School reform, early childhood development, and recruitment of minorities into higher education	$1,600,000[6]

Initiatives of Foundations to Improve Education[1]			
Foundation	Designated Program Area	Initiatives/Focus	Funding Level[2]
Alfred P. Sloan	Education in Science, Technology, and Management	Longitudinal study of career choice among secondary school students conducted by the University of Chicago	$2,999,905
DeWitt Wallace	Improve Elementary and Secondary Schools	Recruitment, Especially Minorities, to Teaching Professional Development of Educators	$22,890,825 $16,394,600
		– Strengthening Teacher Preparation Programs for Middle Grades: Center for Early Adolescence	$1,113,500[5]
		Improve Capacity of Schools to Serve Children	$6,679,700
	School/Community Collaboration	Collaborations to Create New Learning Opportunities	$4,278,242
		– Science Linkages in the Community American Association for the Advancement of Science	$3,672,242[5]
		School/Family Partnerships	$3,389,400
	Career, Service, and Education Opportunities for Youth	Integration of vocational and academic education, workforce preparation	$12,463,000
		– Career Beginnings Program School retention and transition to postsecondary education or full-time employment – Brandeis University	$2,300,000[4]
		– Study of high school career academies – Manpower Demonstration Research Corporation	$2,000,000[5]
		– Expansion of High Schools that Work Program – Southern Regional Education Board	$2,775,000[5]
		– Work Force Skills Program: Research and technical assistance to restructure systems for educating and training workers – National Center for Education and the Economy	$2,290,000[5]
		– Improve ability to make choices about postsecondary vocational training – Kansas State University	$3,300,000[3]
		– Reinforce academic skills – Public/Private Ventures	$3,000,000[3]
	At-Risk Youth	Equity 2000: guidance counseling and evaluation components	$5,925,000
Weingart (CA)[7]	Education	Preschool education, recruitment of minority teachers, application of technology to teaching	$8,334,237[6]
Xerox	Education	Science and technology, recruitment of minorities in higher education, support of Institute for Research on Learning, and National Board of Professional Teaching Standards	$7,100,000[9]
TOTAL			$476,724,070

Source: AIR

1. This listing includes foundations whose annual investment in education and related issue areas is over a million dollars annually or whose initiatives have otherwise garnered national attention. Twenty-eight foundations were identified, with total giving of about $462 million.
2. 1992 awards unless otherwise noted. Information was developed through a variety of sources, and therefore, it remains to be determined whether totals represent annual or multiple year awards.
3. 1994 awards.
4. 1991 awards.
5. This amount is reflected in the total award for this category.
6. 1993 awards.
7. Boundaries of limited service area.
8. 1987-1991.
9. 1990 awards.

DRAFT

THE NEEDS, DEMAND FOR AND SUPPLY OF EDUCATIONAL RESEARCH, DEVELOPMENT AND DISSEMINATION

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THE NEEDS, DEMAND FOR AND SUPPLY OF EDUCATIONAL RESEARCH, DEVELOPMENT AND DISSEMINATION

This second of four background papers for the Research, Development and Dissemination System (RD&D system) Committee of the National Educational Research Policy and Priorities Board (NERPPB) moves on from the topic of the analytic mapping of the educational RD&D system considered in the first paper to a more detailed analysis of the nature of the research, development and dissemination work believed required and demanded versus that which is supplied.

To consider this question in some manageable way, a basis for describing demand and supply must be selected. For the demand side, the first section considers why the conventional economic notions of demand do not fit the educational RD&D system, and then proceeds to consider and comment on four expressions of educational RD&D needs: the NERPPB statement in 1997, the National Research Council (NRC) review of 1992, the National Academy of Education (NAE) review of 1991, and the President's Committee of Advisors on Science and Technology (PCAST) report of 1997.

For the supply side, manageability dictated the selection of a portion of the total supply. A part of the two largest sponsoring sectors -- the federal government and the foundations -- were identified as the basis for choice. In the case of the federal government, the Department of Education (ED) and particularly the Office of Educational Research and Improvement (OERI) has been selected. In the case of the foundations, an illustrative group -- not necessarily representative -- was selected on a basis described more fully in Section II below. Obligations corresponding roughly to the federal fiscal year of 1997 were used to obtain a modicum of consistency among suppliers.

The authors (and we hope the readers) recognize the "rough and ready" character of the numbers. Precision in the numbers is lacking, estimation was required, and comparability of time periods is inexact. Better data simply do not exist. Nonetheless, the numbers are accurate enough to draw some clear comparisons between what expert judgment believes the system should be producing versus what, in fact, it is.

I. Expressions of Demand and Need

A. Market Demand

A conventional economic approach to demand or need would look to the work being done as a reasonable expression of demand, assuming that there is a market for educational RD&D. While some aspects of a market exist such as competition for grants and contracts, educational RD&D is at most no ordinary market, and in some respects, no market at all. A few facts illustrate the point.

A large part of the ultimate consumers -- the educational institutions -- do not purchase the product, but rather have it purchased on their behalf by a variety of sponsors, many of whom have their own agendas about what product should be purchased. Further, education is a public good not subject to ordinary market rules (the knowledge gained from educational research is often freely available). And still further, the sponsors in varying forms -- the Congress, the federal executive branch, the foundations -- specify who is eligible to compete, how much of total educational resources will be given to certain designated suppliers and how the work will be undertaken, as well as what work will be done.

These conditions and practices make reliance on current spending patterns as an accurate picture of true demand unreliable. At best, current spending patterns are an interesting indicator of what is, or more likely, was a judgment about educational RD&D needs adjusted by sponsor perceived amendments to meet current conditions. Given the unreliability of what is as an expression of true demand, one is then left with reliance on expert judgment for a clearer expression of needs.

We now turn to four such expert judgments which have directly or partially addressed the question of educational RD&D needs during this decade. It is noted that this is a "long-running" topic over four decades, but we have stayed with more recent expressions by recognized collective groups.

B. Expert Judgment -- The NERPPB Report of 1997

Consistent with statutory requirements established in 1992, the NERPPB in collaboration with the Assistant Secretary of OERI issued its first report in 1997 under the title of *Building Knowledge for a Nation of Learners.* As is the case with all four expressions of need reviewed here, this report begins with a recitation of the strong need to do a more effective job of education, particularly from early childhood through the secondary level, because of the sharp upward shift in hard and soft skills required for satisfactory employment and a participatory life in our society. Among the four, this statement of the problem is couched in the least dire terms and is the least critical of the existing system.

This report then affirms a relationship between appropriately focused and well done research and the improvement of the educational system. Good research is described as high quality work, steeped in the realities of its ultimate destination in schools, and desirably developed through learning communities and with recognition of the life-long nature of the educational enterprise (pp 11-15).

The report then turns to a discussion of an agenda for establishing priorities for educational research. The intent of the priorities are to "...provide a keener focus..." and to set a "...framework for the development of new practical applications of research ...." Yet the report states that the Assistant Secretary and the Board "...refrained from ranking the priorities." And further: "None of these priorities can stand alone." (pp 17-18) Later in the document, researchers are advised that "...priorities are not prescriptive, but are meant to suggest areas of research that hold promise...." (p 80) Seven priorities are then identified and discussed:

- Improving learning and development in early childhood;
- Improving curriculum, instruction, assessment and student learning at all levels;

- Ensuring effective teaching through improved teacher preparation and professional development;
- Strengthening schools, particularly middle and high schools;
- Supporting schools to prepare diverse student populations effectively;
- Promoting learning in informal and formal settings; and
- Understanding the changing requirements for adult competence.

It is to be noted that these priorities are stated in consumer and institutional outcome terms rather than in research objective terms for the most part. Further, it is difficult to imagine any educational research work that has been left out.

The report ends with two brief chapters on "putting priorities to work" and "powerful questions." With respect to the first, the concentration is on the roles of the many stakeholders and their processes rather than a strategic plan for the work to be undertaken. The discussion of powerful questions is a call for their production rather than a list of what they are.

C. Expert Judgment -- The NRC Report of 1992

At the request of the OERI in advance of the 1992 reauthorization hearings, the NRC undertook a broad review leading to the production of *Research and Education Reform: Roles for the Office of Educational Research and Improvement* in 1992. Though more broadly scoped than this paper (its findings are relevant to a later paper as well), this NRC report deals directly with educational RD&D needs as seen by its expert panel.

Its problem statement is far more wide-ranging, detailed and acerbic than the previous paper's. It identifies educational research nationally as a desperately under-funded enterprise attributable to: (1) the practice-oriented nature of teacher education and subsequent teacher incentives and professional lifestyle; (2) a national predilection for quick fixes; and (3) poor quality research (pp 19-20). It describes the need to "raise the bar" in educational performance in more detail, encompassing basic academic knowledge, conceptual understanding, and the capacity for problem-solving (pp 9-12). And it identifies three flaws in thinking about the role of educational research: that all research is suitable for practice application; that the flow from basic research to widespread application is linear; and that research by itself can lead to reform.

The critique of OERI is equally strong. The NRC report starts by noting the huge scope of the mission accompanied by a paltry level of funding. In its general critique of under-funding, it is particularly critical of short-changing field-initiated work and basic research, noting in the latter case the NRC complaint about under-funding basic research as early as 1977. It characterizes the agency, beyond its control, mired in controversy and politics, and overindulging in short-term projects and diffuse agendas. It dislikes the governance structure, found very little coordination and cooperation with others plus a spotty record in quality assurance and cumulative learning. Only with respect to sustained efforts and linkage to practice did OERI exceed their reputation, according to the report, and in both cases, they could do better. With respect to linkage, the report interestingly noted that textbook publishers are rarely consulted (pp 107-134).

Turning from the critique of then current practice and conditions, the NRC panel first addresses some broad concepts and practices appropriate to educational research. These center on four key values on which educational research should focus: (1) expanding the understanding of the fundamental aspects of human development, learning, teaching, schools and context; (2) pointing the way to effective curriculum, instruction and school organization; (3) providing a sound basis to sort sound innovation and policy from fads; and (4) assessing the status and progress of education systems (p 16). The panel explicitly recognized the complex nature of conducting and applying educational research, and suggests the development of learning communities, being tried in other fields. They also urge the learning of lessons from other fields with respect to field-initiated research and broad-based, coordinated R&D.

The NRC report then expands its more general statements of research needs with more specific identification of educational RD&D priorities, supported with illustrations (pp 19-53):

- The importance of cognitive science and its application to mathematics and reading;
- Curriculum development and improved teaching which translate cognitive science to the real world of teaching and learning;
- School restructuring; and
- Monitoring the state of public education.

The report closes this priorities review with a discussion of the importance of involving the Congress in the results of the research. The report concludes by reiterating the research values noted above, calling attention again to the importance of field-initiated work, though cautioning against the dominance of any one mechanism or any single discipline. In its recommendations related to the content and quantity of educational R&D (pp 135-172), the NRC panel calls for:

- OERI leadership in expanding fundamental knowledge, promoting excellence and equity, and monitoring the state of education;
- A balanced R&D portfolio with expansion of field-initiated research, basic research and sustained (longer term) work; and
- Significantly increased staff and resources. The panel added that *if such additional resources were not forthcoming, the OERI mission should be shrunk to fit available resources* (emphasis added).

D. Expert Judgment -- The NAE Report of 1991

Funded by The Carnegie Corporation of New York, The National Academy of Education assembled a distinguished steering committee for a project on funding priorities for educational research. The result was a report in 1991 entitled *Research and the Renewal of Education.*

The principle problem, as seen in this report is succinctly stated: "The research base is under-funded, limited in scope, and lacks connection to what happens in classrooms. Research studies tend to be short-term and conducted in isolation." (p 6) In explicating this summary, the report details not only the inadequacy of total educational R&D resources, but also a serious deficiency in field-initiated work. With respect to foundation funding, it criticizes a tendency toward "action projects" and the move from research to demonstration with much of the remaining research directed to evaluation and monitoring of small scale projects. The report states that foundations devote less than 4% of total giving to R&D, and less than 15% of educational grants to R&D. The report complains that R&D has come to mean "replication and dissemination" rather than research and development.

The report's data and findings, based importantly on a survey among stakeholders (though no summary is provided), adds to the concerns identified above an additional list of issues concerning the organization of the research work (pp 21-34):

- Comprehensive effective strategies are lacking;
- Patterns of support are episodic and unstable;
- Studies tend to be short-term, small scale and not interconnected;
- Public funding is of insufficient "critical mass";
- Public funding is subject to unhelpful funding allocation rules and changing direction; and
- Opportunities for coordinating field-initiated work and theory building are too few.

In the steering committee view, all of these deficiencies result in fragmented and theoretically diffuse R&D, slow to respond to needs, and too small, short-term and without inclusion of context.

In prescribing solutions to the problems, the NAE report takes a much more process-oriented approach than the NRC panel review. This approach begins with several cross-cutting themes which call upon researchers to: illuminate what could be, as well as examine what is; recognize that learning occurs everywhere, not just in school; adopt a broad focus beyond a particular school level; and recognize that more money will come as the result of better quality work rather than more of the same (pp 35-43). The report then goes on to identify "special opportunities" (pp 45-60). These include a combination of process and substantive ideas, such as:

- The cultivation of active learning for all citizens;

- The development of a new form of assessment that will improve instruction, not just measure student performance;
- More research on educational opportunities and teaching approaches for minorities;
- More research on the social organization of schooling;
- Stronger connections between research and teaching; and
- A long list of other ideas including study of: teacher education in life cycle terms, rationalized and standardized patterns of curriculum and their impact on teachers; ethnographic work on class-rooms; teaching higher order skills; technologic integration; how teachers do new things; teacher learning; and teacher acquisition and retention.

The NAE report characterizes its recommendations as going beyond "what" needs to be studied to "how" education research can be strengthened (pp 8-11). The recommendations encompass five major components as follows:

- More funding for educational R&D, specifically increasing the total from less than 0.5% to 4-6% of total educational spending.
- An increase in consensus-building and quality control, including study of the establishment of a National Panel of Reviewers.
- Stronger organization of the research including more field-initiated work and a more systematic approach that addresses: cooperative and integrated research goals across agencies, longer federal commitments to research and experimentation, renewed federal role in large scale studies, more and larger longitudinal data sets, equitable resource distribution among performers, priorities related to pressing problems with probable high research pay-offs, clear incentives for researchers and practitioners, incentives for state and district participation, a quid pro quo of more money in return for longer-term, better coordinated projects, and long-term investment in emerging fields and new scholars.
- The development of incentives for new researchers (by foundations and corporations).
- Stronger linking of research to practitioners.

E. Expert Judgment -- The PCAST Report of 1997

The Panel on Educational Technology, organized in the spring of 1995 under the auspices of the President's Committee of Advisors on Science and Technology, undertook a review of the application of several technologies to the K-12 education system. This review was conducted through briefings and discussions with knowledgeable stakeholders as well as a non-exhaustive examination of the literature. The result is a *Report to the President on the Use of Technology to Strengthen K-12 Education in the United States*, dated March 1997.

While addressed to a particular dimension of educational activities, the review grounded itself in comprehensive educational policy problems, and addressed educational research broadly as well. As with all other reviews considered here, the central educational problem seen in this report is "raising the bar" on the number and quality of high school and postsecondary graduates in order to meet the labor force and modern societal demands in the United States.

A number of the findings of the review provide some interesting insights into the issue under consideration and judgments about educational research:

- The panel asserts a quality control problem in educational research related to both methodology and politics.
- They find foundation preferences for action-oriented projects as did the NAE review.
- "Early stage" research on important work such as software development is unlikely to be done by the private sector because of the "free rider" problem.
- Professional development for teachers is both critical and expensive. Each hour of professional development time in the US will add about $4-5 billion to educational costs in the nation.
- Pre-service training on technology utilization in 22 states is of poor quality.
- The nation now spends about $3.5-4.0 billion annually on educational technology (1.3%), and should be spending somewhere in the $6-28 billion range.
- Meta-evaluations appear to validate the efficacy of technology with some distressing specifics. For example, higher utilization of technology is inversely related to student needs, notwithstanding the fact that the disadvantaged students show the largest educational gains from effective utilization.
- A "constructionist" approach to curriculum in which the teacher functions as a facilitator, appears to be the most effective and consistent with technology applications.

The PCAST report contains six major recommendations (pp 7-10) as follows:

- Focus on learning *with* technology, not about technology. Both are important, but the former is critical.
- Emphasize content and pedagogy, and not just hardware.

- Give special attention to professional development. Professional development should be 30%, not 15% of a technology budget.

- Engage in realistic budgeting. About 5% of the total K-12 budget should go for technology (about $13 billion annually nationally), not the current 1.3%.

- Ensure equitable, universal access. Toward this end, Title I technology spending should stay at or above current levels.

- Initiate a program of experimental research, both in general and in technology. R&D should increase from its present 0.1% to 0.5%, or $1.5 billion annually. The program should include: (1) basic research; (2) "early-stage" research (new forms of software, content and technology-enabling pedagogy): and (3) rigorous large scale experimentation.

F. Summary Analysis of Needs

The expert judgments about the driving problem for the educational system and the importance of high quality and relevant RD&D to its solution is monotonously consistent among the reviews, differing only in their intensity. The NAE and the NRC reviews were the most extensive and explicit; and the evidence since those reviews in NAEP, TIMMS and analyses such as the Murnane and Levy work cited in the first paper serve to underscore the seriousness of the problem. Indeed, the seriousness with which one views this central problem is perhaps crucial for conclusions drawn about remedies.

Essentially all of the reviews suggest an educational reform framework through which to review and frame improvements of educational RD&D. And there are some elements of consensus about directions which should be taken:

- All agree that the total effort is under-funded substantially, with basic research being particularly undernourished.

- All agree that the methodological foundations and research quality needs to be substantially improved, some think as a prerequisite to larger funding. Further, there is clarity about the need to properly assess micro-level research before declaring it ready for "prime time." What are the appropriate standards of evidence for success?

- All agree that a complete diet of small, short-term projects in a constant state of flux is a losing proposition, and that long-term, large scale experimentation and research-laden demonstrations are required both to learn and scale up.

- Reviews earlier in the decade were consistent with the need for more field-initiated research, but facts discussed in Section II and some internal tensions discussed below make this finding less clear now.

- All four earnestly talked about setting priorities; but to the extent that priorities means making choices, one refrained, two tabled some reasonably specific notions and then talked about "balance," something for every discipline or processes, and only one "hard-charged" the priorities question, albeit about only one part of the enterprise. One of the middle ground reviews, to its credit, made clear that failure to provide more resources should result in a trimmed OERI mission, though it did not venture how to do it.

- All agreed that the translation of research to practice and practitioners is difficult and crucial, and suggested a variety of ways to involve the practitioners from the outset. Few, however, had much to say about the resources or resource allocations to dissemination and technical assistance. They did have strong views about professional development and the availability of good data, particularly longitudinal data.

There is much less clarity and, presumably, agreement about other matters and some internal tensions among some of the points being made in most or all of the reports. Perhaps the most striking to one coming fresh to the issues is the apparent disinclination to deal directly with the choices about the substance of the work, in contrast with the processes by which such choices are made by others, the division of RD&D by the type of research, development or dissemination, or the allocation of resources among established performers (labs, centers, field-initiated, etc.). The latter receive the bulk of attention (or even Congressional specification); and while all are important, one could argue that the discussion of research priorities might well start with the questions: what new knowledge is important or critical to solution of the most critical educational problems? and what are the most productive research opportunities available?

For the authors of this analysis, the most consistent answers from thoughtful and informed observers center on the need to increase the learning performance for those for whom it does not come easily. This should come through the expansion and application of the growing knowledge base from cognitive science to the class-rooms and the teachers and students who live there, bringing different experiences, skills and attitudes which will affect their needs and paths to progress. While there are almost countless other questions and issues which may be productively researched, if we fail with the central questions, we are unlikely to be content with the results. If this is correct, then it provides an additional way to examine priorities and needs which can be applied in our next section.

Three other matters in reciting problems in the current RD&D system and prescribing solutions which deserve more clarity include the following:

- A number of the reviews make brief or hesitant reference to the use of learning communities or learning organizations. While not extensively tried or conceptually and operationally standardized, the learning organizations concept provides a far more participatory and interactive knowledge building approach than more traditional evaluations. Such learning organizations may provide education with a more satisfying approach to the inclusion of practitioners in the knowledge building process than other techniques now being tried or advocated.

- All of the reports refer adversely to politics in the educational research process, and suggest directly or otherwise the elimination of such intrusion (usually while recommending a series of measures such as increased funding requiring action by the political process). While the structural remedies usually recommended to preclude adverse intrusion will be discussed in a subsequent paper, it is important here to be clear about the role of politics -- good and bad -- in the RD&D process. All sponsors, including elected political ones, have a legitimate say in establishing the objectives and making use of the results of the resources they dispense. What is objectionable is decision-making unrelated to merit or underlying need. Most successful public R&D programs have reached good results not by excluding politics altogether, but rather by inclusion in effective and appropriate ways.

- Finally, the statements of need reviewed here (and elsewhere) are often less clear than they need to be about strategies to move the RD&D system from wherever it is to the desired destination. With anything of the size and history of the educational RD&D system, changing the status quo -- particularly significantly -- as contemplated in these reviews requires phased deliberative action. The failure to provide a sensible implementing strategy is likely to insure continuation of the status quo. In creating a strategy, it is very useful to have a "triggering" event; and such a possible event exists in the yet to be defined research initiative in the President's FY1999 budget ($50 million in OERI and $25 million in NSF).

As noted above, the research priorities statements reviewed here also contain internal tensions among the points that they make as well as matters left unclear and ambiguous. Two, in particular, are important to identify and consider:

- The first tension focuses on a sound concept of balance, perhaps accompanied by a disinclination to stir up disputes among colleagues, and the need to create priorities and some sense of direction. In this tension, balance becomes a device to avoid difficult, but necessary choices (someone is going to make them in the end anyway, perhaps someone with less information and basis for judgment). A priorities statement without choices provides neither the guidance to promote change and focus nor the basis for judging whether the statement has any impact. This is not to suggest that balance is an undesirable concept for the RD&D portfolio, but rather to suggest that it is an unsatisfactory "cop out" as a substitute for priorities.

- The second tension, both related and more difficult, focuses on the twin notions of participatory processes and field-initiated research as against the twin notions of national agendas and RD&D program coordinated coherence. Educational research agendas and priorities reviews, including those discussed here, routinely champion all four ideas without discussing how these inherent tensions are to be harmonized or resolved; so routinely they are not resolved to the detriment of all four notions. This generic problem is made more difficult by the continuing national fealty to the desirability of keeping the federal government out of educational curricular matters. This adds the challenge of how to be national without being federal, an issue with which we are struggling in professional teaching standards and also testing with apparently quite different levels of success. All that we know about such tensions suggests that clarity of the problem to be solved and an inclusive process to harmonize the tensions are important to effective resolution.

II. Selective Illustrations of Supply

A. Selection Methodology

In this paper, we focus on the Department of Education (ED) and foundations, as illustrative of the main funders of educational research, development, and dissemination (RD&D). Information on ED funding was obtained from several different sources including ED's budget and OERI Institute summaries of research projects.

In order to determine which foundations to focus on as the biggest funders of educational RD&D, we first identified those foundations with substantial grant-making in the education area. Next, we had discussions with experts to determine which of these foundations were most likely to be conducting work in education RD&D. We then examined the foundations' annual reports to further identify their spending and to classify it into various categories. Last, we spoke to education program officers in the foundations to confirm our classification of their education spending and to clear up anything that was not spelled out in sufficient detail in their annual reports. Our levels of education research grant-making by foundations differ from those cited in the report from the National Academy of Education for several reasons including different time period (we look at 1996 and they look at 1989) and different definitions of education research.

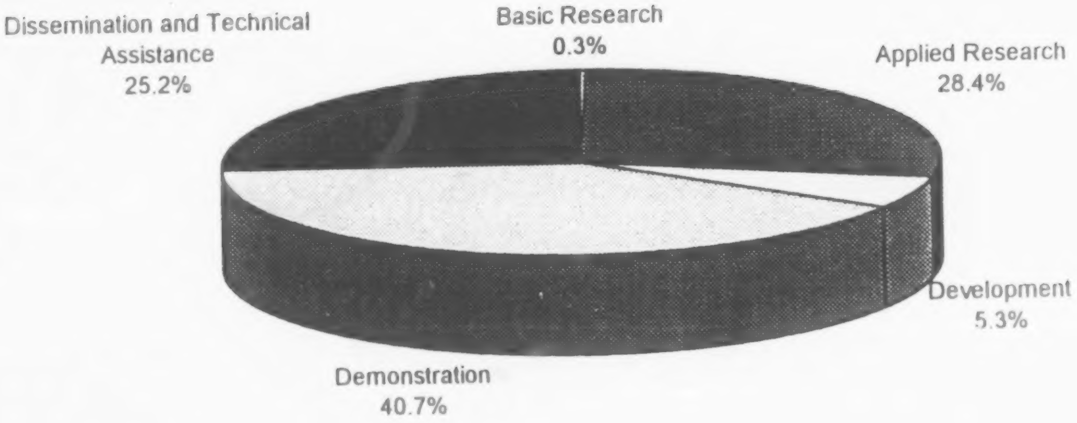
B. U.S. Department of Education

Figure 1 shows the distributions of 1997 Department of Education RD&D obligations. This chart shows that demonstration makes up the largest component of these obligations (over 40 percent). The next largest areas of spending are applied research, and dissemination and technical assistance. Development comprises only 5.3 percent of obligations and basic research comprises less than one percent of obligations.

Table 1 shows that basic research spending by ED was approximately $2.9 million in 1997 or three tenths of one percent of ED spending on RD&D. Approximately two-thirds of this spending was by the OERI Institutes (mostly in the areas of curriculum, achievement and assessment, and early childhood education) and roughly one-third of basic research spending was by the National Board of Professional Teaching Standards (NBPTS). Field-initiated research represents 26 percent of the Institutes' total budgets. In addition, it is noted that the special education applied research budget exceeds that of OERI, and substantial demonstration and larger scale applied research are in the program agencies rather than OERI.

Applied research, evaluation, and development accounted for nearly thirty-five percent of ED spending on RD&D. In 1997, approximately $240 million were spent on applied research and evaluation, and $45 million were spent on development. OERI Institutes accounted for almost $46 million of the applied research and evaluation total, and $6 million of the development total. Most of this spending was done by R&D centers. The regional labs account for a relative small portion of this funding, with only $7.7 million spent on applied research and evaluation, and $12.7 million spent on development. ORAD's spending accounts for a large fraction of the demonstration spending. Most of this demonstration funding involves impact evaluations, but a large portion does not.

Figure 1
Percentage Distribution of 1997 Department of Education RD&D Obligations



89

Table 1

Department of Education 1997 RD&D Obligations by Knowledge-Building Category by Organization (Obligations $ in thousands)

Organization	Basic Research	Applied Research & Evaluation	Develop-ment	Subtotal R&D & Evaluation	Demon-stration	TA, Dissem-ination & Other	Total
OERI Institutes	1,817	45,840	5,840	53,497	0	502	53,999
R&D Ctrs	(1,784)	(26,766)	(3,140)	(31,690)	(0)	(0)	(31,690)
Field initiated	(0)	(13,982)	(0)	(13,982)	(0)	(0)	(13,982)
Other	(33)	(5,091)	(2,700)	(7,824)	(0)	(502)	(8,327)
Regional Labs	0	7,650	12,750	20,400	0	30,600	51,000
National Dissemination System & Bd	0	0	0	0	0	18,567	18,567
ORAD	1,084	16,997	2,149	20,230	171,245	0	191,475
NBPTS	(1,000)	(2,000)	(2,000)	(5,000)	(0)	(0)	(5,000)
G&T Center	(84)	(1,267)	(149)	(1,500)	(0)	(0)	(1,500)
All other							
w/ impact eval.	(0)	(0)	(0)	(0)	(114,340)	(0)	(114,340)
wo/impact eval.	(0)	(13,730)	(0)	(13,730)	(56,905)	(0)	(70,635)
NCES	0	0	0	0	0	82,617	82,617
Assessment	(0)	(0)	(0)	(0)	(0)	(32,617)	(32,617)
Other	(0)	(0)	(0)	(0)	(0)	(50,000)	(50,000)
Elementary, Secondary	0	1,000	2,000	3,000	152,979	25,554	181,533
Special Education	0	90,676	7,000	97,676	0	49,872	147,548
Rehab. & Disability	0	41,000	8,000	49,000	18,942	0	67,942
Vocational & Adult	0	5,179	5,000	10,179	0	4,998	15,177
Higher Ed.	0	1,000	2,000	3,000	0	0	3,000
PES Evaluation	0	24,268	0	24,268	0	0	24,268
Other Misc.	0	6,000	0	6,000	0	0	6,000
TOTAL	2,901	239,610	44,739	287,250	343,166	212,710	843,126
PERCENTAGE	0.3	28.4	5.3	34.0	40.7	25.2	100.0

Table 2 and Figure 2 break down ED's applied research and development spending into several categories. The largest fraction of this spending was in the area of at risk K-12 students, with nearly 30 percent of ED's spending in this area. The other dominant areas of spending were comprehensive reform, with an over 14 percent share; early childhood with a 12 percent share; and postsecondary, with an over 10 percent share.

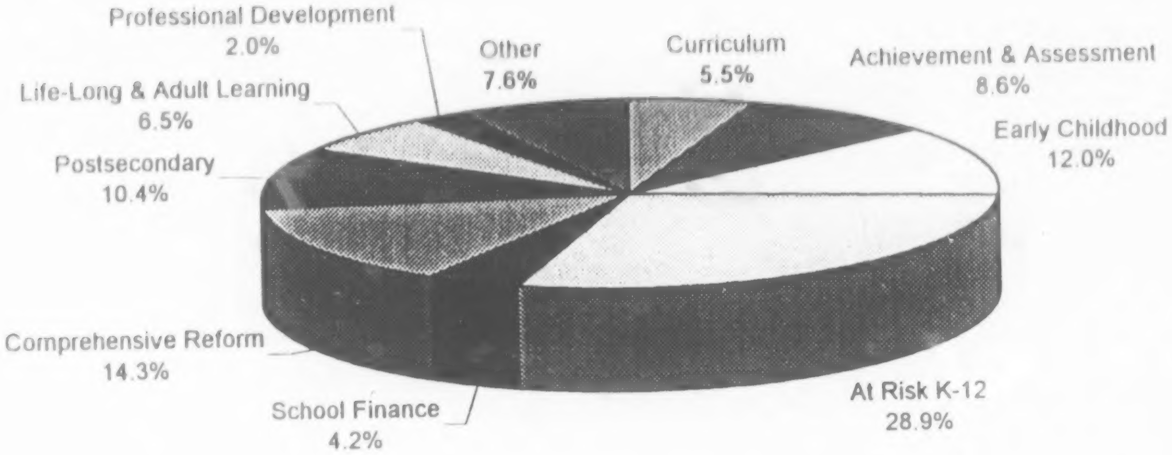
Table 2

Percentage Distribution of 1997 National Institute R&D and Departmental Evaluation Obligations

INSTITUTE & BUDGET ($000)	APPLIED RESEARCH AND DEVELOPMENT									
	Curriculum	Achievement & Assessment	Early Childhood	At Risk K-12	School Finance	Comprehensive Reform	Post Secondary	Life-Long Adult	Professional Development	Other
SAI 14,672 Centers (9,864) Field- Initiated (3,686) Other (1,122)	25.1	42.5	0.0	20.4	0.0	8.1	0.0	0.0	3.9	0.0
ARI 14,672 Centers (9,137) Field- Initiated (3,682) Other (1,853)	0.0	0.0	2.5	74.1	0.0	14.0	0.0	0.0	2.5	7.0
ECI 8,028 Centers (3,344) Field- Initiated (2,792) Other (1,862)	6.0	0.0	94.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Policy 7,574 Centers (4,400) Field- Initiated (1,697) Other (1,477)	1.8	3.6	0.0	0.0	42.3	44.1	0.0	0.0	8.2	0.0
Postsecondary 9,054 Centers (5,000) Field- Initiated (2,037) Other (2,017)	0.0	2.5	0.0	0.0	0.0	0.0	37.1	37.7	0.0	22.7
Other ED Evaluation 24,268	0.0	0.0	6.0	36.0	0.2	19.1	19.8	6.9	0.0	11.8
Percentage of Total	5.5	8.6	12.0	28.9	4.2	14.3	10.4	6.5	2.0	7.6

[1] While we cannot categorize basic research spending by the Institutes, we know that basic research comprises approximately 3.4 percent of Institute spending. This spending is shown here primarily in curriculum, achievement and assessment, and early childhood education.

Figure 2
Percentage Distribution of 1997 National Institute R&D and Departmental Evaluation Obligations



Demonstration without research accounts for approximately forty percent of ED's RD&D spending. Non-research demonstration spending was approximately $343 million in 1997. ORAD accounts for $171 million of this funding, the Office of Elementary and Secondary Education accounts for $153 million, and the remainder is funded by the Office of Rehabilitation and Disability.

Dissemination and technical assistance accounts for approximately another one-fourth of ED spending on RD&D; approximately $213 million in 1997. NCES accounted for nearly $83 million of this spending and the Office of Special Education, nearly $50 million. Other major funders of dissemination and technical assistance were the regional labs and the Office of Elementary and Secondary Education.

We were unable to divide spending by regional laboratories into these topical categories, due to the nature of their operation, which includes considerable work across categories. However, we have categorized spending by the regional laboratories into various types of research on the basis of their descriptions. Table 3 shows that the largest concentration of funding by regional laboratories is in the areas of language and cultural diversity, as three regional laboratories, with funding totaling over $14.5 million, concentrated on this topic. Other specialty areas include urban education; rural education; early childhood education; curriculum, learning, and instruction; educational technology; assessment and accountability; and school change processes.

C. Selected Foundations

Figure 3 displays the percentage distribution of 1996 foundation grant-making. Comprehensive reform and dissemination activities are by far the largest areas of spending by foundations, accounting for over 50 percent of foundations grant-making. The next largest areas for research funding are postsecondary education and curriculum research and development. The remaining areas of research each account for less than 5 percent of total foundation grant-making.

Table 4 shows foundation grant-making in greater detail. The selected substantial funders of education RD&D in 1996 were the Annenberg Foundation, and the Ford Foundation, both with over $20 million of funding. Below are some descriptions of individual foundation research concentrations.

The Annenberg Foundation RD&D funding concentrates on comprehensive school reform. In 1993 the foundation announced a $500 million challenge grant to create and replicate school reform programs around the country. While most of this funding is for actual program implementation, some funds have been set aside for research, evaluation, and assessment. Additionally, part of this funding has been used for the Annenberg Research Institute, which focuses exclusively on research and development.

The Carnegie Corporation's education program has four sub-programs: early childhood, young adolescent, education reform, and general education. Their research spans several areas including curriculum, achievement and assessment, early childhood education, at risk K-12, comprehensive reform, and professional development. One example of their work is a program which provides technical assistance to schools in fifteen states to help them implement education reforms, and to measure the impacts of the reforms. Another example is a project which studies

Table 3

Spending by Regional Laboratories
(In Thousands)

Lab	1997$	Research	Specialty
Northeastern Region	6,055	Assessment; Parent Involvement; Policy; Professional Development and Leadership; Equity; Use of Technology	Language and Cultural Diversity
Mid-Atlantic Region	5,227	Systemic Reform Led by Local Schools; Organizing Urban Communities for Systemic Educational Reform; The Urban Fellows Program; Fostering Educational Resilience and Learning Success; Integrative Analysis of the Knowledge Base	Urban Education
Appalachian Region	4,149	School Readiness; Academic Achievement; School-To-Work Opportunities; Designing Professional Development; Scaling Up Internet Use	Rural Education
Southeastern Region	5,612	Improving School Capacity to Monitor Progress Toward Reform Goals; Improving High Schools' Self-Assessment Capabilities; Scaling Up Efforts to Ground Teachers' Professional Growth and Ability to Make Major Changes in their Approach to Instruction; Studying the Impact of Individual State and Region-Wide Policies and Practices on Schools and Students (particularly those in disadvantaged districts and communities); Working with Teenage Parents	Early Childhood Education
Midwestern Region	6,637	Curriculum, Instruction, and Assessment (Technical Domain); Human Development, Learning, and Motivation (Personal Domain); Organizational Learning and Development (Organizational Domain); Systems Integration and Systemic Change	Curriculum, Learning, and Instruction
Southwest Region	5,526	Enhancing Family and Community Involvement in Education; Addressing Diversity; Language and Culture; Aligning and Supporting Policy Development; Changing the Organization and Management of Schooling	Language and Cultural Diversity
Central Region	4,194	The Learning Program; The Teaching Program; School Development for Learning; Leadership for Learning; School and Family Partnerships for Learning; Readiness for Learning: Early Childhood Education; Community Development: Schools at the Center	Educational Technology
Western Region	5,465	Whole School Reform; Language and Cultural Diversity; Early Intervention, Care and Education; School-to-Work Transition; Teacher Assessment and Certification; Development and Use of Scoring Rubrics for State Performance-Based Assessment Systems	Assessment and Accountability
Northwestern Region	5,169	Assessment and Accountability; Early Childhood Education; Rural Education; School Change Process	School Change Processes
Pacific Region	2,965	Characteristics of Effective Language and Culturally Diverse Schools and Teachers; Effective Alternative Assessment in Multi-Cultural/ Language School Settings; Effective Strategies for Engaging Language and Culturally Diverse Populations, Parents, and Communities; Linguistically and Culturally-Based Strategies for Fostering Student Motivation and Learning	Language and Cultural Diversity

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Figure 3
Percentage Distribution of 1996 Selected Foundation Grant-making

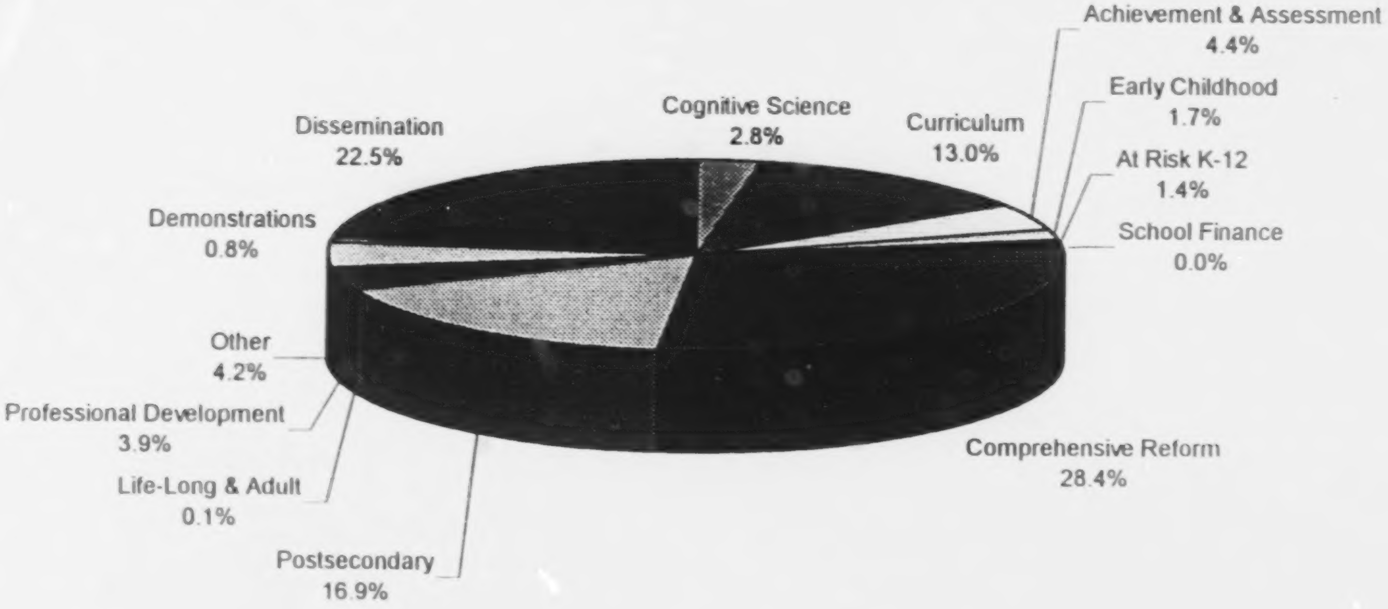

Table 4
Annual Research, Development, and Dissemination Grant Making By Foundations - 1996
($ In Thousands)

FOUNDATION	BASIC RESEARCH	APPLIED RESEARCH AND DEVELOPMENT										DEMONSTRATIONS WITHOUT A RESEARCH COMPONENT	DISSEMINATION, OUTREACH, TECHNICAL ASSISTANCE	TOTAL
	Cognitive Science	Curric.	Achieve & Assess	Early Childhood	At Risk K-12	School Finance	Comp. Reform	Post Sec.	Life-Long Adult	Prof. Dev.	Other			
Annenberg Foundation							15,200						5,000	20,200
Carnegie Corporation		1,961	425	1,760	485		179			1,300	700	300	5,547	12,657
DeWitt Wallace - Reader's Digest Fund					667					667	667		100	2,101
Ford Foundation		5,192	1,850		410		5,585	1,519		1,378		700	3,637	20,271
IBM Foundation							11,000*							11,000
John D. and Catherine T. MacArthur Foundation			370				1049	40	120	199			1471	3,249
The Pew Charitable Trusts		2,595	300					5,380					4,475	12,750
Andrew W. Mellon Foundation		774						14,057			1,384			16,215
James S. McDonnell Foundation	1,466	3,741												5,207
Rockefeller Foundation		150	150				55	900		978			8,745	10,978
Spencer Foundation	2,190	2,495	2,627	450	272		3,918	57	17	545	2,704		274	15,549
Total	3,656	16,908	5,722	2,210	1,822	0	36,986	21,953	137	5,067	5,455	1,000	29,249	130,177
Percentage	2.8	13.0	4.4	1.7	1.4	0.0	28.4	16.9	0.1	3.9	4.2	0.8	22.5	100

*Estimate of annual amount based on total programs ($35,000) and discussion with IBM staff.

how to improve learning and development for students aged three to ten. A third example is the development of a voluntary teacher assessment system.

The DeWitt Wallace Reader's Digest Fund focuses on three programs in education: school libraries, professional development, and the recruitment of nontraditional teaching candidates for low income districts. Only a small portion of their funding is used for research and dissemination.

The Ford Foundation is the largest funder of education RD&D, with nearly $20.3 million in 1996. The Ford Foundation funds research in the areas of curriculum, achievement and assessment, at risk K-12 education, comprehensive reform, postsecondary education, and professional development. Ford's greatest areas of spending are in curriculum, comprehensive reform, and dissemination. Some examples of their work are developing area studies programs and evaluating public school reform initiatives.

The IBM Foundation changed its traditional pattern of computer support and hardware grants to more proactive partnerships with schools in educational grant-making in comprehensive reform in the early 1990's. Under the Reinventing Education Program, in 1994 10 grants totaling $25 million were made for 3-5 years to help finance comprehensive reform with a variety of different models followed by 12 two-year grants totaling $10 million to pursue the more promising model in the first round. An external evaluation is underway with an interim process evaluation of the first 10 grantees already issued by the Center for Children and Technology.

The John D. and Catherine T. MacArthur Foundation funds education research in the areas of achievement and assessment, comprehensive reform, postsecondary education, life-long and adult learning, and professional development. Their greatest amount of funding is in the technical assistance and dissemination area. Some examples of research projects they have funded are an evaluation of the New American Schools reform initiative, and supporting projects that enhance the professional development of teachers.

The Andrew W. Mellon Foundation is a major funder of postsecondary education research. Some examples of their research activities include a study of improving the quality and effectiveness of graduate education in ten research universities, testing how electronic materials can improve teaching and reduce costs, and a survey which provides data on college outcomes.

The James S. McDonnell Foundation concentrates on basic research in the area of cognitive science and on curriculum reform. In the area of basic research some projects they have funded include "Functional Organization of Human Ventral Visual Areas" and "The Neural Basis of Skill Learning Using FMRI." Their applied work in the curriculum area includes the development, implementation, and assessment of instructional materials for teaching science to students in grades 1 to 5; and developing and studying how software can help students to learn and express themselves.

The Pew Charitable Trusts fund education research in the areas of curriculum, achievement and assessment, and postsecondary education. They also fund a great deal of dissemination. Some examples of their research and dissemination include an evaluation of standards-based reform in seven school districts, development and dissemination of models of performance funding for public colleges and universities, and the provision of technical assistance to urban school districts for implementation of standards-based reform.

The Rockefeller Foundation funds research in the areas of curriculum, achievement and assessment, comprehensive reform, postsecondary education, and professional development. Additionally, they fund large projects which have dissemination components. Some of their research projects include a study of the Equity 2000 precollege intervention program, evaluation of the subject knowledge of teacher candidates, and an analysis of the Comer School Development Program in San Diego city schools. Some examples of their dissemination activities are acting to increase the impact of the report of the National Commission on Teaching and America's Future through support of public outreach and implementation of its findings, and expanding the number of schools using Comer's school improvement approach.

The Spencer Foundation funds research programs to support educational researchers at different stages of their professional careers. They provide grants to graduate students, postdoctoral researchers, and faculty members to support work that shows promise for improving educational practice. Areas of research covered by these grants include basic research in cognitive science, and applied research in the areas of curriculum, achievement and assessment, early childhood education, at risk K-12 education, comprehensive reform, postsecondary education, life-long and adult learning, professional development, and other areas. They also fund a small amount of dissemination.

The AT&T Foundation was contacted, but not included in the tabulations because of the newness of its program. In 1996, it completely revamped its educational program from traditional employee matching gifts to higher education institutions and grants to business related science and engineering programs to a proactive partnership with school districts in comprehensive reforms centered on technology. They established a $50 million 5-year program starting in the last half of 1996, not unlike the IBM program with a technology focus.

D. Summary

While both the Department of Education and selected foundations concentrate on applied rather than basic research, their emphases within applied research are somewhat different. Both Ed and the foundations focus on comprehensive reform and postsecondary education. ED also emphasizes at risk K-12 education and early childhood education. The foundations have a greater focus on achievement and assessment and curriculum research and development. Areas of applied research that appear to be de-emphasized by both sectors are school finance, professional development, and life-long and adult learning.

Comparing the current distributions, practices and conditions in the Department of Education and the selected foundations with the expert judgements, there are both changes from the time of the system reviews at the beginning of the decade described in Section I and suggested changes where either little has changed or matters have gotten some worse. Specifically:

- The admonition to increase field-initiated work, helped no doubt by Congressional allocation formulas, has resulted in a substantially larger share, recognizing that the total amounts remain small.

- Serious work is being done to establish more rigorous standards for micro research and experimentation labelled promising or exemplary. The use of peer review is more frequent, and more demonstrations have evaluation or research components.

- Stakeholder, including practitioner, participation continues in traditional and sometimes token and ineffective ways.

- Most everything else remains largely unchanged. Total resources have grown very little, particularly in the research part of OERI, but no one has yet taken seriously the NRC review admonition to trim the OERI mission in the absence of more dollar and staff resources.

- Basic research has grown not at all, and both the National Institute for Child Health and Human Development (NICHD) and the Office of Naval Research (ONR) have more significant cognitive science programs than ED. The research to expand and translate that work to the classroom remains to be addressed in the federal sector.

- The federal applied research and development is still dominated by small, short-term projects. Any large scale federal demonstrations are directed to marginal change and financed outside of OERI. Large scale experimentation and demonstrations are financed outside the federal government. With the splintering of an already "sub-critical" sized staff into five components tied up with allocation rules, it is unclear how the institutes could mount an aggressive experimentation program.

- The foundations, as the reviewers alleged, do appear in part to be favoring action-oriented projects, though not all of them. They are also paying more attention to curriculum development and professional development.

- There is no sign yet of a coherent, integrated national educational research agenda even at the broadest levels. The research agenda is highly decentralized to the centers and field-initiated performers And there is as yet, no clear plan to develop a process to weld it together, though the Department's adoption of the concept of an analytic agenda is a beginning.

III. Implications for the Congressional Report

The implications of this analysis of the need versus the supply of educational RD&D are substantial for the field and potentially significant for the Board's report to the Congress. There remain significant and damaging shortfalls between perceived needs by a succession of the reviewers and the supply responses. Resources are so far short of perceived needs that they constrain options and reasonable responses to other deficiencies. The educational basic research component is growing up outside the Department and the link to practice remains unaddressed. The federal government appears to be getting out of the large scale experimentation and demonstration field with respect to comprehensive reform. The intermediation and dissemination mechanisms appear outmoded for at least comprehensive reform support, and perhaps expensive for other purposes. Whatever conceptual merit the Institutes may have had, at their present staffing and resource levels, they are likely marching themselves into irrelevance. And past remedial prescriptions have not sold well.

This somewhat gloomy diagnosis leaves the Board with some challenging questions:

- If the Board is persuaded that the diagnosis is correct, is it prepared to take on the battle again? If so, how is it going to adjust the prescription so that it has a better chance of success? Is it, for example, prepared to use the FY1999 budget initiative as a way to set some priorities, restructure processes and capacities, and set forth a strategy that can build confidence among funders and stakeholders?
- Does it make any sense in restating basic research needs to seek to recapture the cognitive science agenda within OERI, or instead, build links to the work where it now exists and the agenda for the translation into applied form?
- Can the work going on to implement GEPRA, the analytic agenda, and support of the new initiatives be harnessed together to begin the development of a strategic RD&D plan and system which creates a non-federal, national agenda driven by the urgent need to improve K-12 performance?

As we complete the remaining papers and prepare for the March meeting, we will hone these questions and potential responses for the Board's consideration.

DRAFT

COMPARISON OF SELECTED FEDERAL RD&D STYLES

Submitted to:

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March 6, 1996

COMPARISON OF SELECTED FEDERAL RD&D STYLES

This third of four background papers for the Research, Development and Dissemination System (RD&D system) Committee of the National Educational Research Policy and Priorities Board (NERPPB) proceeds from the prior analytic mapping and the demand and supply topics to consideration of alternative styles in the conduct of federal RD&D programs. After consultation with the Committee, two examples were selected: the cognitive science program of the Office of Naval Research (ONR) and the National Institutes of Health (NIH) with particular attention to the learning disabilities and reading program of the National Institute of Child Health and Human Development (NICHD).

The methodology used to prepare this paper included the collection of written information about each of these programs followed by conversations with knowledgeable individuals within or hierarchically over the concerned programs. This analysis also relies on the considerable experience of the author with both Defense and domestic RD&D programs, though not as a cognitive scientist.

The paper will discuss the ONR and then the NIH/NICHD programs, followed by a comparison with the Office of Educational Research and Improvement (OERI) and the implications of the analysis for the Board's Congressional report.

I. Cognitive and Neural Science and Technology in ONR

The cognitive science and technology program resides in the broader context of a quite formal and structured RD&D program process within the Department of Defense and a long history of quality research in ONR, dating back to World War II. In a structure first adopted in 1962 for the planning, budgeting and management of RD&D that has changed remarkably little since, the Department and its component parts consider RDT&E (research, development, test and engineering) through six major categories starting with basic research (known as 6.1), exploratory development (6.2), then advanced development (6.3), and on toward engineering, prototyping, testing and operational manufacturing. Although primarily designed for hardware, the structure is applied to behavioral end educational research as well. All of the ONR work of interest is done in the 6.1, 6.2 and 6.3 categories.

The actors, the processes, the documentation and the decision criteria for each of the categories are formally spelled out. The work proposed and undertaken is always linked directly or indirectly to important missions or knowledge-building priorities. Even for basic research, potential naval relevance or relationships to core competencies for the Navy need to be established and understood. Attached is an extract from the Navy manual which describes the process. Notwithstanding the formalism and bureaucratic structure, the ONR has maintained a consistent reputation for very high quality work, no doubt through the use of the seasoned judgment of its technical staff.

One of the clear causes of its positive reputation lies in the long history of very strong internal technical capabilities within ONR, which in many areas conducts its own work as well sponsoring and overseeing the work done by extramural resources. This characteristic as well as the need for secrecy in some elements of the total ONR program leads to other distinctive characteristics of the RD&D style. External peer review does not exist in the award of grants and contracts, relying instead on review by internal expertise. Relatively few formal efforts are made to create incentives for high quality or new researchers beyond the incentives created by the solicitations for grants and contracts and the money they provide for awardees. The technical staff do, however, cruise the technical conferences as well as the literature with an eye to emerging talent, and a portion of the grants are set aside for young investigators, 1-5 years beyond their terminal degrees (usually turns out to be those 5 years out with burgeoning publication records). And the dissemination activity in ONR is quite traditional: internal briefings by researchers or supervising staffs to interested Navy staff to summarize or explain technical reports, and journal publication to meet the interests of non-Navy consumers.

The cognitive and neural science and technology program is large and diverse, and the concentration here is on the work most related to education. Even at this narrowed definition, the budgets are substantial (an estimate is under development). The project grant sizes in the 6.1 and more modest 6.2 efforts will run in the $50,000-150,000 range, while the project budgets for the more ambitious of the 6.2 efforts and all of 6.3 work will exceed $1 million in total and not infrequently $1 million per year over 3-5 years. The program included in 1996 more than 110 performers of which 63% were universities, many among the leading national research universities. The program ranges over five areas of training-related research:

- Computational models of the mechanisms of human learning and performance (6.1);
- Effective instructional strategies, emphasizing tutorial instruction (6.1/6.2);
- Specialized areas of computer science needed for training applications (6.1/6.2);
- Exemplary demonstration applications (6.2/6.3); and
- Authoring tools for affordability (6.2).

The very strong orientation to research goals and underlying mission can be seen in the way program managers articulate an integrated set of research questions:

- "What is the precise nature of the expertise that is the goal of training?
- What are the internal learning processes that transform the novice into the expert?
- How do we feed those learning processes the experience needed to optimize progress? (This is the problem of instructional strategies.)

- How do the answers to these questions differ for different major domains of expertise?" *(from an internal briefing chart of April 23, 1997)*

The program is also firmly anchored in eventual practical application in three different types of training delivery options (embedded training, shipboard training and schoolhouse training) with demonstrable cost effective results. For example, an intelligent computer-assisted instruction (ICAI) model developed by John Anderson of Carnegie Mellon was reporting 33% reductions in instructional time and a typical one standard deviation improvement in achievement. This tutoring model was evaluated in a controlled experiment with 9th grade algebra word problems which showed moderate improvement against SAT and Iowa test problems and large improvements on problem solving and multiple representation questions on proportion of correct answers (experimental n = 470 and control n = 120). These results were then correlated with an evaluation of an Air Force avionics tutoring model and other Navy console operation experiments.

The ONR program reflects a strong sustained commitment in training technology with computer assisted instruction and computer-based training in the 1960s, with interactive video in the 1970s, with artificially intelligent tutoring starting as early as 1969 and becoming a major emphasis in the 1980s, and with virtual reality in the 1990s. The program is continuously dealing with two key aspects: first, the development of psychologically valid models of knowledge which can be learned by humans and expressed in computational form; and second, the development of sophisticated instructional apparatus which simulates problems and provides effective instructional strategies, assessment methods and trainee interface. And the results must always meet cost effectiveness tests. For example, the high-end ICAI models are rich in detail (if this, then that) and student prompting (e.g., cutting off faulty reasoning paths), and thus complex and expensive. The question then becomes whether the high end models produce significant improvement in human performance *and* are cost effective relative more rudimentary and generic models plus individual reasoning capacity.

In this program, ONR considers its open research issues important to achievement of the two standard deviations improvement in learning effectiveness than it desires to be found in pursuit of: true natural language interaction, effective instructional strategy options, comparative value of various cognitive models, the added value of sophisticated tutoring strategies, the effective design and integration of multimedia, and the effective use of virtual reality. Some of these issues are illustrated in the prior paragraph. These issues pose not only technical problems, but substantial costs, probably requiring some guessing about potential payoffs. While not the subject of this paper, it is interesting to note that ONR staff suggested that the biggest and most readily transferrable target of their work would be to vocational education where they perceive little work to be now underway.

II. The Learning Disabilities and Reading Program of NICHD/NIH

Prior to discussing the NIH program most closely connected to educational research, it is appropriate to set the context more broadly in health research and the operation of the NIH. Health research like the national security function is more generously endowed than education by huge amounts. The annual NIH budget exceeds $13 billion, complemented by large expenditures by foundations and private health institutions producing health products and services, in the latter category most particularly pharmaceutical companies. It is important to note at this point that the structure of the health enterprise is such that there are substantial incentives for significant private investment in health productions, since the potential returns are attractive and patent protected. Notwithstanding these other sources of sponsorship for health RD&D, the federal government is both a dominant actor and regulator, without an ideological overlay about the appropriateness of the federal role.

All of this funding should not be assumed to relieve health RD&D from issues of priorities, planning and budget constraints. Like ONR, the health RD&D system operates within the context of a formal process established by the Department of Health and Human Services (HHS). At the broadest levels, the Department sets forth both substantive and process guidance, now in the form of strategic plans required by the Government Performance and Results Act (GPRA). In its first plan in September 1997, HHS identified four principles which provide structure to its research investment strategy: priority for basic research, priority to investigator-initiated research, reliance on peer review for quality assurance, and commitment to a broad and qualified research base. On those four principles, it then imposes a set of six broad strategic objectives. Attached is the most recent research goal statement.

As discussed in the second paper, HHS has evolved a process which they believe effectively balances the tensions between capitalizing on the creative and stimulating virtues of investigator-driven projects with the needs of national program coherence at the institute and programmatic levels. The mechanisms include the work of institute director advisory groups and grant review councils which together with periodic statements of critical research questions help to achieve consensus and coherence of the aggregate agendas (*based on personal communications with Dr. Susanne Stoiber, Deputy Assistant Secretary of Planning and Evaluation, HHS and Dr. G. Reid Lyon, Chief, Child Development and Behavior Branch, NICHD).*

The NIH has, of course, developed through time into one of the world's premier R&D organizations. That development, particularly since the 1960s has been marked by a strong and growing public support during which time the Congressional action more often than not increased Administration requests for appropriations. In the late 1960s, NIH Director Shannon cultivated a close and supportive relationship with the Congress which has withstood the test of time and periodic Presidential efforts to impose budget discipline. The NIH has and continues to face problems such as: how to deal with rare diseases and conditions, how to increase innovative research, and how to encourage new researchers against the "old boy network" tendency of peer review, but it has rarely had to contend with out-of-control political micro-management or ideologically-based external specification of the details of research agenda or performer specifications.

Turning from the broad structure and processes of the NIH and its institutes to the specifics of the Learning Disabilities program and its dominant component -- reading research, it is large and diverse. Following its selection as the result of legislation in 1985 as the interagency center for work on learning disabilities, NICHD began to rapidly expand a program dating back to 1963 with efforts directed to finding the causes and potential remedies for reading difficulties among children and adults. From FY1985 through FY1997, NICHD has invested almost $143 million in learning disabilities -- and predominantly -- reading research. The annual levels in FY1995-1997 are respectively $14.1, $15.8 and $21.8 million.

The work is now conducted in 18 different sites organized under 5 learning disabilities centers, 5 multi-disciplinary program projects for the study of language development and disorders and dyslexia, and 3 large research programs to study treatment and intervention approaches for learning disabilities in oral language, reading and written language (several programs have more than one site). (*Lyon, "Progress and Promise in Research in Learning Disabilities,"* Learning Disabilities, Vol. 8, No. 1, Winter 1997) The basic and small scale work is carried out in university, clinical and school setting, but there is also substantial large scale assessment and remediation work underway in school settings.

The larger scale school site work is occurring in Houston, Texas, in Colorado, the D.C. schools, Albany, New York and Seattle. Houston has been underway for 7 years with a longitudinally followed data base of 4000, D.C. schools with 800 per year over five years, Seattle with 600 per year and the others with small but significant samples. The target groups are disabled or at risk students, meaning that the population is not all disabled. The research design is not and cannot be experimental random selection, but it is quasi-experimental with differing treatment groups, longitudinal tracking, and common assessment and protocols for each of the three research categories across all sites. The program is reporting that effective treatments are able to raise 95% of the treatment group up to national reading standards. The program has been working almost exclusively in reading, but is beginning to venture into mathematics. While the program is working with large populations and in schools, it has not yet directly experienced the problems of district scale-up, but the Director states that those issues will be confronted through Robert Slavin's comprehensive reform work.

The program is structured around seven different types of disabilities; listening, speaking, basic reading skills, reading comprehension skills, written expression, arithmetic calculation skills, and mathematic reasoning skills. They are assessed to be different from each other in etiology, developmental course and response to instruction. The research strategy seeks to:

- Identify etiolologies;
- Develop early predictors;
- Map the developmental courses of the disabilities;

- Identify commonly co-occurring disorders and secondary social and behavioral characteristics; and
- Identify and assess the efficacy of treatments.

So far, the program believes it is learning several important things. First, it estimates that approximately 33% of all children are disabled or at high risk with respect to reading, and perhaps as many as 60% may be at risk for less than optimum reading skills. Reading deficiencies in turn produce high risks for serious problems in educational development, motivation, self-esteem, and a host of subsequent problems. They find little difference between males and females, conventional wisdom notwithstanding, and believe that there are reliable ways to assess phonological deficits in late kindergarten and first grade. For those with reading difficulties at 9 years of age, 74% will continue to have reading problems throughout their school tenure.

The findings of the NICHD work has embroiled their research in the political battle between phonics and whole language, with the phonic enthusiasts in the Congress believing incorrectly that the findings supports the phonics approach exclusively. In fact, the research does support the criticality of phoneme awareness and the development of the alphabetic principle, but also the importance of an additional set of skills involving the construction of meaning from text which invokes aspects of the beliefs of those in the whole language camp. Many students with proactive and skilled parents in reading preparation will proceed through the development of phoneme awareness and alphabetic skills with lightening like speed, making prolonged drilling over extended periods of time an educational demotivator. For those who have difficulties with those initial phases however, it is a great mistake to proceed further until those skills are secured. Without them, the researchers believe, reading competence will not be achieved.

The program's leadership advocates expansion and extension to deepen its understanding of the causes and instructional strategies which will address yet better difficulties in reading. With respect to assessment, the program director testified before Congress on July 10, 1997 (House Committee on Education and the Workforce) that a phonemic assessment tool for young children had been developed which in 15 minutes at $10-15 a case can predict reading deficiency with about 92% accuracy. As a part of a list of needed remedial action in his testimony, the director called attention to the inadequate preparation of teachers of reading and the importance of competency based training and board certification.

III. Comparisons with OERI

The RD&D processes in a Departmental context are newer and less well articulated for education than for ONR or NICHD. The new Strategic Plan for 1998-2002 of September 30, 1997 in response to GPRA requirements is the Department's second effort. Selected pages from that document bearing on the RD&D process are attached. Like its counterparts in HHS and the Navy, it sets forth broad goals and objectives, and it does a particularly commendable job of relating R&D effort to mission objectives (the ED plan is generally ranked in the top three among domestic agencies). It is unlike the comparative illustrations in two undesirable ways:

- It is much clearer about the mission and application goals than it is about the research goals and priorities, though it should be noted that the HHS-wide document is quite general too. In HHS, the scope of NIH is so large that much of the detail is left for derivative documents.
- There is a strong sense in the ONR and NIH cases that the science base is firmly rooted, and that there is a clear sense of direction and cumulative learning. In the comparative cases, the growing knowledge base is a powerful determinant of both future research and operational actions, giving knowledge-building a crucial role in future improvement. There is no such comprehensive sense for educational RD&D.

As known from other analyses, the OERI agenda is not yet appropriately linked into the Departmental process, though initial steps are underway (see Morrill & Weiss, *Talent, Tensions and Transition —An Organizational Analysis of the Planning and Evaluation Service*, February 1997). HHS and ONR have this linkage far better in hand.

Although repetitive with the two earlier papers, one is again struck in this comparative analysis with huge differential in resources among the three agencies which inevitably impacts the style adopted. But it is more than just staff and dollar resources; it also goes to the issue of whether the education RD&D program is an endless series of small applied research projects unrelated to an evolving critical set of knowledge bases or a cohesive agenda of cumulative knowledge-building. On this criterion, the comparative agencies are more well-developed.

The related issue of how to resolve the tensions between the values of field initiated and participatory processes and the need for national agenda and coherence is handled quite differently by the two comparative agencies. ONR has a strong hierarchical process which assures the coherence, perhaps with sufficient openness at the detail level to encourage innovation. In any event, it is not a useful model for OERI. HHS attacks the problem through the institute director advisory groups, grant review councils and periodic articulation of critical research questions in combination with strong reliance on field-initiated research. HHS staff report an ability to achieve effective balance with these processes. NIH is a relevant model. While OERI has made progress on increasing the field-initiated component of its program (virtually all of the institute programs), it has yet to develop the coordinated coherence in any meaningful way.

With respect to quality assurance, ONR makes clear that there is more than one way to achieve it. Careful consideration of the context, however, leads one to understand that peer review would not fit the ONR context very well, while NIH could not survive without it in spite of a very strong in-house staff. And peer review is the appropriate route for OERI, which it is now trying to implement. It is important to recognize where peer review processes are appropriate and where they are not. In this context, peer review is understood to mean not just the collective judgment of experts, but the effective power to *decide* as opposed to *advise*. With this meaning, peer review is effective in ranking proposals and evaluating project performance. It is not, appropriately, elsewhere used to set institutional goals or strategic objectives which is properly left to institutional leaders and sponsors with technical advice from expert groups.

The NIH and ONR have largely positive and proactive relationships with the elected political decision-makers in their institutional lives in which they maintain the initiative in consensus-building. OERI has no such situation, and is clearly less proactive. Indeed, the effort appears to have been more on keeping executive branch and Congressional political actors out of the RD&D program rather than seeking their constructive participation. The alternative strategy uniformly works better and will be revisited in the roles and structure paper (paper #4).

The critique of OERI as having insufficient sustained effort on critical topics discussed in the second paper is underscored with the long-run commitments and cumulative learning in the ONR and NIH programs. This condition complements the finding of excessive small, short-term projects in OERI noted above. Further, OERI is like NIH and ONR in having both close and more distant organizational access to large scale experimentation and demonstration resources, but is considerably less well linked to such activity.

Finally, the comparison of OERI and ONR/NICHD basic research is important on both conceptual and substantive grounds. On conceptual grounds, the comparison provides confirmation of the judgment that OERI sponsors far too little basic research. On substantive grounds, NICHD and ONR sponsor cognitive science which, particularly in the NICHD case, would be appropriate for OERI. Given these commitments, it would appear foolish to attempt to replicate that effort in OERI. Instead, it would seem wiser and more effective to link and expand it to meet OERI needs, and contemplate the initiation of complementary basic and applied work in the translation of the cognitive science knowledge base more broadly into classroom settings.

IV. Implications for the Congressional Report

The implications of the comparative analysis is to suggest that models do exist for effective RD&D systems which it is important to notice are built only over time. These systems are to some degree -- usually defined as "critical mass" -- self-contained in that they have the stature and resources to do the work as well as to plan and oversee it. Indeed, they are unlikely to be able to do the second job well, if they don't have the recognized stature to do the first.

With respect to the planning and oversight, there are some clear and useful examples of how to strengthen the process and performance of the system as a whole, and the Department and OERI have initiated steps which can be pushed forward, so long as progress on the first set of issues identified above are also pursued aggressively.

Finally, the route to a more appropriate balance for basic and applied research would appear to be to build on and link to existing efforts focused heavily on strengthening the needed knowledge base in learning.

Attachments:

1. Navy RD&A Management Guide
2. HHS Strategic Plan
3. ED Strategic Plan

Department of the Navy

NAVSO P-2457 February 1993

RD&A
Management Guide

12th Edition

0515LP2099100

The Guide's purpose is to help participants in DON RD&A understand the overall system and to provide a ready reference to governing instructions and other issuances. The Guide itself cannot be cited as authority for official actions.

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Production and Deployment, the fielding of the system to provide mission capability needs of the Navy and Marine Corps. The double arrows at each link emphasize that the RD&A process is not a simple linear progression, but rather involves much iteration and feedback.

Test and Evaluation (T&E) is a vital constant, occurring in every phase of development and production. Formal T&E, governed by a carefully developed plan, begins in the Demonstration and Validation phase (referred to informally as 6.3B, see 2.1.1.3). Successful RD&A programs are invariably characterized by (1) effective use of T&E to manage risk and (2) early and effective communication and coordination among developers and prospective manufacturers and users of the system under development. T&E is a complex subject, which is discussed in detail in Chapter 7 and Appendix G of this Guide.

2.1.1 Categories of RD&A Effort. For planning, funding and review purposes, the Defense RDT&E Program is structured in six categories. These categories often are referred to by the numbers of the categories under the DOD Programming System. The six categories are described below.

Ref: DON Budget Guidance Manual; (NAVCOMPT 7102.2)

2.1.1.1 Research. Budget Category 6.1, Research, includes all effort of scientific study and experimentation directed towards increasing knowledge and understanding in broad fields directly related to long-term DON needs. Research is conducted to ensure that both cutting-edge scientific discoveries and the general store of scientific knowledge are optimally utilized in the development of superior Naval equipment, strategies, and tactics. The 6.1 program is a major source of basic and applied research effort in electrical engineering, materials science, applied mathematics, and other disciplines (see C3.1.2) of importance to the DON.

2.1.1.2 Exploratory Development. Budget Category 6.2, Exploratory Development, includes effort directed toward the solution of specific Naval problems, short of major development projects. The role of the exploratory development program is to ensure that, as technological advances appear, they are investigated for possible development/exploration to determine applicability to future Naval programs. This type of effort may vary from fairly fundamental applied research to sophisticated bread-board hardware.

2.1.1.3 Advanced Development. Budget Category 6.3, Advanced Development, includes all projects which are characterized by the development of hardware for experimental test. The prime result of this type of effort is proof of design. At the core of the Advanced Development program is the imperative to develop and make available to the Fleet new and advanced technologies that will ensure the long-term superiority of U.S. forces. Advanced Development is further broken down into 6.3A and 6.3B effort. 6.3A projects are not related to specific ship or aircraft applications and are mostly developed as Advanced Technology Demonstrations (ATDs). Only highest risk/highest payoff efforts are selected as 6.3A projects. Many programs bypass this risk projection/risk assessment step and proceed directly into 6.3B programs which develop technologies intended for application on specific systems, e.g., ships or aircraft.

2.1.1.4 Engineering and Manufacturing Development. Budget Category 6.4, Engineering Development, includes programs that are typically in engineering and manufacturing development but have not yet received production approval.

2.1.1.5 Management and Support. Budget Category 6.5, Management and Support, includes support of installations or operations required for general research and development use. Included would be test ranges, military construction, maintenance support of laboratories, operations and maintenance of test aircraft and ships, and

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studies and analyses in support of the R&D program.

2.1.1.6 Operational Systems Development. "6.6." Operational Systems Development, includes those projects still in Engineering and Manufacturing Development, but which have received approval for production or for which production funds have been included in the DOD budget submission for the budget or subsequent fiscal year. All work in this area is identified by major line item projects that appear as "RDT&E Costs of Weapon System Elements" in other programs, e.g., Program 1, Strategic Forces. Although Operational Systems Development is an official budget category, "6.6" is a term used for convenience in reference and discussion. Thus, there is no program element number 6.6xxx.

2.2 PLANNING FOR RD&A

For the categories of effort described above, except 6.5, this chapter will provide overviews of the following:

- Principal Participants. Provide a listing of the principal individuals and organizations involved in planning.
- Documentation. Describe the top-level documents used in planning and their purpose.
- Process and Schedule. Where a process for the development of planning for a category has been established, provide a brief description of the process. Provide an insight into the timing of the planning activities.
- Decision Criteria. Provide an overview of the decision criteria for each category.

2.2.1 Budget Category 6.1, Research.

2.2.1.1 Principal participants. The Chief of Naval Research (CNR) is responsible to the Secretary of the Navy (SECNAV), through ASN(RD&A), for the overall investment strategy for the Research program and for developing research and technology programs which effectively address future operational naval needs and capabilities identified by the Chief of Naval Operations (CNO).

The Director, Science Directorate (ONR) is responsible to the CNR for managing the Research Program.

The CNO is represented by the Director, Test & Evaluation and Technology Requirements (N091), who acts as Resource Sponsor for planning, programming, and budgeting S&T and as representative of the user in establishing warfighting requirements for S&T.

2.2.1.2 Documentation. There are two key documents used during the development of the annual Research program:

(1) ONR Navy Research Investment Strategy which provides overall strategy for Naval research; and

(2) ONR Naval Needs & Science Opportunities which provides specific direction for allocation of Navy research resources.

2.2.1.3 Process and schedule. Long-range naval objectives and requirements are integrated with promising scientific opportunities into an annual program plan. CNR and N091 conduct an annual process of evaluation, prioritization, and selection of submitted research proposals for approval by ASN(RD&A).

2.2.1.4 Decision criteria. Decision criteria for approving 6.1 Research projects are:

- Does the project maintain a broad sustaining, versatile program in all science areas of potential naval relevance?
- Does the project emphasize core competencies in ocean sciences, advanced materials and information sciences to accelerate technology transition in DON high priority area?
- Does the project maintain balance in the program? Note: The 1992 program

Invested 60% of funding in evolutionary research, 15% in high risk/high payoff revolutionary effort, and 25% in research closely associated with Fleet applications.

- Does the project train students in science and engineering disciplines critically needed by the Navy in nurturing a strong and responsive in-house laboratory research capability?
- Does the project accelerate transitions to meet critical scientific gaps in essential Fleet programs?

2.2.2 Budget Category 6.2, Exploratory Development.

Ref: OCNR Instruction 3910.3

2.2.2.1 Principal participants. The Chief of Naval Research (CNR) is responsible to SECNAV, through ASN(RD&A), for the overall investment strategy for Exploratory Development for developing research and technology programs which effectively address future research and future operational naval needs and capabilities identified by the CNO.

The Director, Test & Evaluation and Technology (N091) acts as Resource Sponsor for planning, programming, and budgeting S&T and as representative of the user in establishing warfighting requirements for S&T.

The Director, Technology Directorate (ONR) is responsible to the CNR for managing the Exploratory Development program. He is assisted by the Science Directorate which helps to identify high-leveraged opportunities.

2.2.2.2 Documentation. The Exploratory Development program consists of a set of Block Programs which are documented in Block Program Plans, developed by Navy Laboratories and R&D Centers. A Block Program Plan is submitted for each Block Program. A Block Program is an integrated group of technology projects with closely related applications and/or technical objectives. The Block Program Plan describes the program to be executed for the Execution year and Program Objectives Memorandum (POM) years.

2.2.2.3 Process and schedule. The Exploratory Development program development integrates the planning, programming, and budgeting processes. The process is carried out on an annual basis with each quarter of the fiscal year emphasizing a distinct portion of the process as follows:

- First Quarter: Accountability. Technology Directorate management reviews and assesses the previous and current years' programs.
- Second Quarter: Strategic Planning. The Investment and Mission Area Strategies are developed by the Technology Directorate.
- Third Quarter: Execution Planning. The Block Program Guidance is issued and the Block Plans for the following fiscal year are developed.
- Fourth Quarter: Block Program Plan reviews, modification, approval, and funding. Funding documents are promulgated by 30 September.

2.2.2.4 Decision criteria. The decision criteria for Exploratory Development programs are:

- Does the program help to maintain Navy technological superiority and provide the capability to counter new threats?
- Does the program provide technology opportunities that preserve the strategic Naval initiative and extend strategic flexibility?
- Does the program improve the effectiveness of the U.S. deterrent posture?
- Does the program present significant threats to U.S. adversaries?

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- Does the program provide technology that reduces cost of acquisition and operation and maximizes system cost–effectiveness?

2.2.3 Budget Category 6.3A, Advanced Technology Development (ATD).

2.2.3.1 Principal participants. The Chief of Naval Research (CNR) is responsible to SECNAV, through ASN(RD&A) for the overall investment strategy for Advanced Technology Development and for developing research and technology programs which effectively address future operational naval needs and capabilities identified by the CNO.

The Director, Test & Evaluation and Technology Requirements (N091) acts as Resource Sponsor for planning, programming, and budgeting S&T and as representative of the user in establishing warfighting requirements for S&T.

The Director, Technology Directorate (ONR) is responsible to the CNR for managing the Advanced Technology Development program. He is assisted by the Science Directorate, which helps to identify high–leverage opportunities.

2.2.3.2 Documentation. Advanced Technology Development proposals prepared by Navy Laboratories, Warfare Centers and industry provide inputs for developing the 6.3A program.

2.2.3.3 Process and schedule. OPNAV (N091) establishes ATD requirements. Based on those requirements, CNR solicits proposed concepts, reviews the concepts, and submits its evaluation to N091. N091 reviews the concepts and submits its evaluation to ASN(RD&A).

After ASN(RD&A) review and concurrence, CNR requests that the proposers develop detailed concept papers for selected concepts.

The CNR in conjunction with the ATD executing organizations, evaluates the proposed concepts and develops a list of recommended ATD program for N091 to consider.

The ATDs program is updated and necessary Planning, Programming, and Budgeting System (PPBS) actions taken.

After PPBS and Congressional approval, CNR is authorized to proceed with the ATD execution.

2.2.3.4 Decision criteria. The design criteria for an ATD are:

- Is it responsive to priority warfighting requirements?
- Is it consistent with DDR&E guidance and coordinated with Project Reliance? (See 2.3.1.)
- Does it have medium to high risk but high transition potential and is it scheduled to be completed in 3 to 6 years?
- Does it have strong OPNAV sponsorship?

2.2.4 Budget Categories 6.3B, 6.4, and "6.6," Advanced, Engineering, and Operational Systems Development.

2.2.4.1 Principal participants. Program Executive Officers (PEOs), Direct Reporting Program Managers (DRPMs), Systems Command Commanders (SYSCOMs), and Program Managers (PMs) are responsible to the Navy Acquisition Executive (NAE) to plan and execute the programs.

Resource Sponsors within OPNAV (Surface Warfare, Submarine Warfare, and Air Warfare) are responsible for (1) representing the warfighter in the acquisition process and (2) representing the program in the PPBS.

Ref: DOD Directive 5000.1, Part 3; SECNAV Instruction 5000.2

2.2.4.2 Documentation. Milestone reviews require rigorous assessments of a program's status and plans for the future. The information needs of the milestone decision authority and supporting staffs at each level, however, must be satisfied without creating an undue burden on the Program Manager. Accordingly, the milestone review

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documentation concept, established by DOD Directive 5000.1, DOD Instruction 5000.2 and DOD 5000.2-M, provides for stand-alone supporting documentation and two standardized information displays, the Integrated Program Summary and the Integrated Program Assessment, as shown in Exhibit 2-2. DOD Instruction 5000.2, Parts 2 and 11, provides additional information on these documents, including who prepares, validates, and approves them. DOD 5000.2-M prescribes format and content.

Stand-Alone Supporting Documentation. The purposes of the stand-alone supporting documentation such as the Cost and Operational Effectiveness Analysis (COEA), Test and Evaluation Master Plan (TEMP), Acquisition Program Baseline (APB), the Program and Independent Cost Estimates (PCE & ICE), and the Manpower Estimate Report, are to meet the information needs of the milestone decision authority, supporting staffs, and review forums.

Integrated Program Summary (IPS). The purpose of the IPS is to provide a succinct, integrated picture of the program's status, from the Program Manager's perspective, for use by the milestone decision authority, supporting staffs, and review forums.

Integrated Program Assessment (IPA). The IPA is a critique of the IPS and summarizes the results of the independent assessments conducted by the supporting staff and review groups. It is a

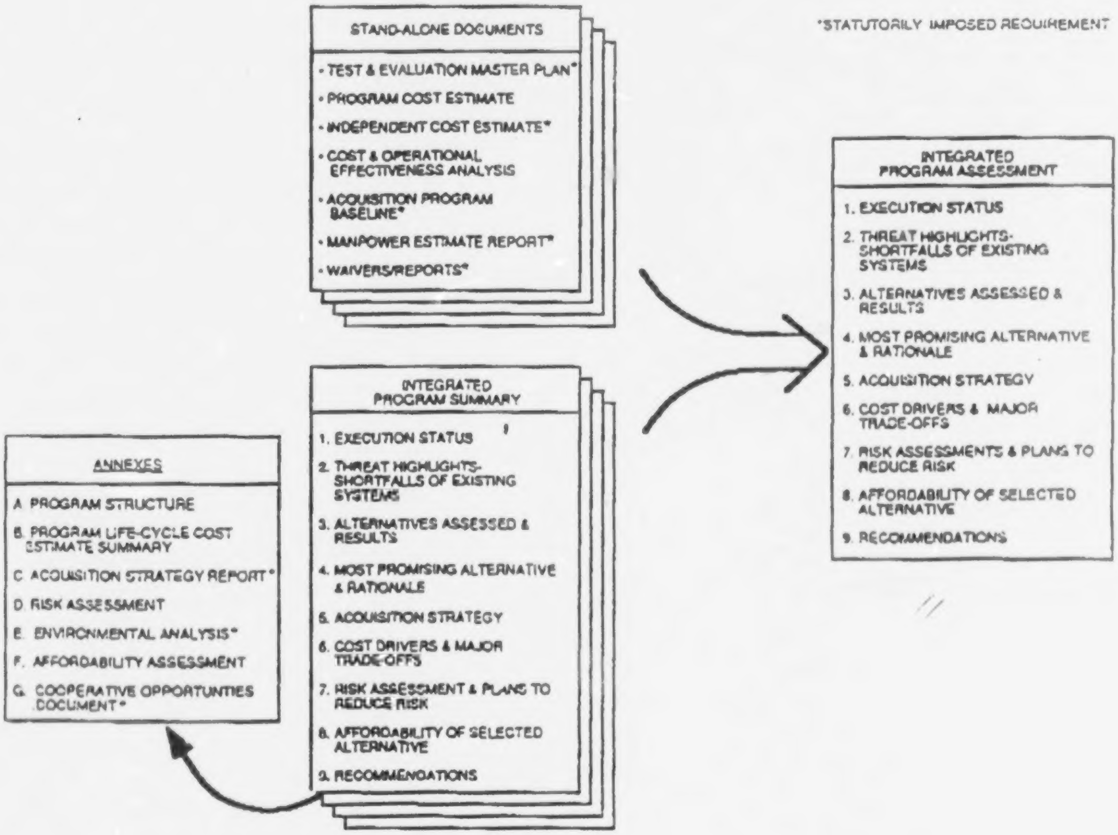
*STATUTORILY IMPOSED REQUIREMENT
STAND-ALONE DOCUMENTS
• TEST & EVALUATION MASTER PLAN*
• PROGRAM COST ESTIMATE
• INDEPENDENT COST ESTIMATE*
• COST & OPERATIONAL EFFECTIVENESS ANALYSIS
• ACQUISITION PROGRAM BASELINE*
• MANPOWER ESTIMATE REPORT*
• WAIVERS/REPORTS*
INTEGRATED PROGRAM ASSESSMENT
1. EXECUTION STATUS
2. THREAT HIGHLIGHTS-SHORTFALLS OF EXISTING SYSTEMS
3. ALTERNATIVES ASSESSED & RESULTS
4. MOST PROMISING ALTERNATIVE & RATIONALE
5. ACQUISITION STRATEGY
6. COST DRIVERS & MAJOR TRADE-OFFS
7. RISK ASSESSMENTS & PLANS TO REDUCE RISK
8. AFFORDABILITY OF SELECTED ALTERNATIVE
9. RECOMMENDATIONS
INTEGRATED PROGRAM SUMMARY
1. EXECUTION STATUS
2. THREAT HIGHLIGHTS-SHORTFALLS OF EXISTING SYSTEMS
3. ALTERNATIVES ASSESSED & RESULTS
4. MOST PROMISING ALTERNATIVE & RATIONALE
5. ACQUISITION STRATEGY
6. COST DRIVERS & MAJOR TRADE-OFFS
7. RISK ASSESSMENT & PLANS TO REDUCE RISK
8. AFFORDABILITY OF SELECTED ALTERNATIVE
9. RECOMMENDATIONS
ANNEXES
A. PROGRAM STRUCTURE
B. PROGRAM LIFE-CYCLE COST ESTIMATE SUMMARY
C. ACQUISITION STRATEGY REPORT*
D. RISK ASSESSMENT
E. ENVIRONMENTAL ANALYSIS*
F. AFFORDABILITY ASSESSMENT
G. COOPERATIVE OPPORTUNTIES DOCUMENT*

Exhibit 2-2 — Milestone Documentation Concept

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major issue-oriented document and provides the basis for the milestone decision review agenda.

DOD Instruction 5000.2, Part 2 and Part 11, Section C; DOD 5000.2-M

2.2.4.3 Process and schedule. DOD Instruction 5000.2, Part 13, establishes the process for milestone reviews for Category ID by the Under Secretary of Defense for Acquisition once the Program Manager determines that the program has achieved all the objectives of the current acquisition phase and is ready to proceed into the next acquisition phase. Other acquisition categories, i.e., IC, II, III, and IV follow similar processes as established in SECNAV Instruction 5000.2 and OPNAV Instruction 5000.42.

Schedules for most programs have five milestone decision points and five phases during the acquisition process as illustrated in Exhibits 2-3 and 2-4. Low risk programs may not need a Demonstration-Validation phase, in which case Milestones I and II may be combined. These provide the basis for comprehensive management and the progressive decision-making associated with all programs.

Ref.: DOD Instruction 5000.2, Part 3

2.2.4.4 Decision criteria. The decision criteria are based on rigorous, objective assessments of a program's status and plans for managing risk during the next phase and the remainder of the program. The acquisition strategy and associated contracting activities explicitly link milestone decision reviews to events and demonstrated accomplishments in development, testing, and initial production.

Note: Chapter 1 of this Guide, "The Acquisition Process—an Overview," provides what might be termed a "map" of the official DOD acquisition process. The graphics are amplified by information on facing pages which identify the particular parts of DOD Directive 5000.1, DOD Instruction 5000.2, and DOD 5000.2-M that contain information on the documents, officials, and actions depicted in the graphics.

2.3 SCIENCE AND TECHNOLOGY INITIATIVES

The DON Science and Technology effort, which is managed by the Office of Naval Research, has been the subject of the recent Defense initiatives described below.

2.3.1 Cooperation/Coordination in Science and Technology within DOD. In late 1989, the Deputy Secretary of Defense challenged the Services to create a new approach to Science and

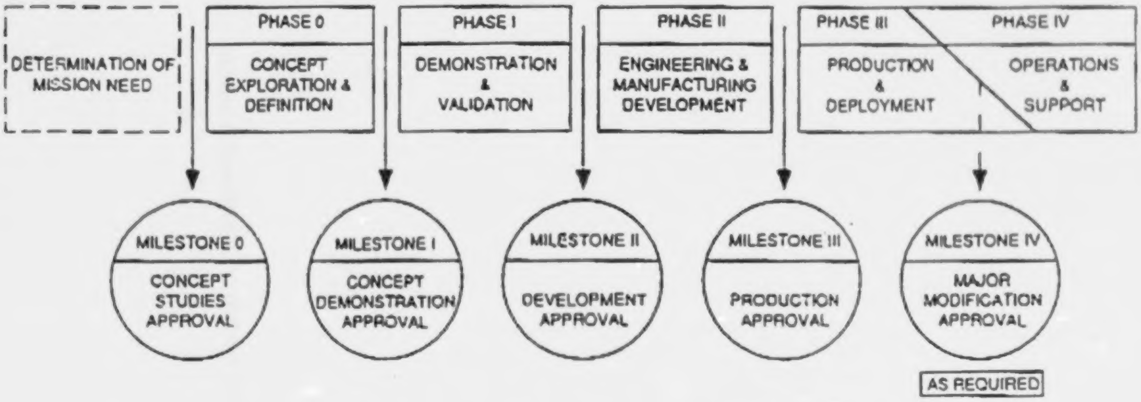
DETERMINATION OF MISSION NEED
PHASE 0
CONCEPT EXPLORATION & DEFINITION
PHASE I
DEMONSTRATION & VALIDATION
PHASE II
ENGINEERING & MANUFACTURING DEVELOPMENT
PHASE III
PRODUCTION & DEPLOYMENT
PHASE IV
OPERATIONS & SUPPORT
MILESTONE 0
CONCEPT STUDIES APPROVAL
MILESTONE I
CONCEPT DEMONSTRATION APPROVAL
MILESTONE II
DEVELOPMENT APPROVAL
MILESTONE III
PRODUCTION APPROVAL
MILESTONE IV
MAJOR MODIFICATION APPROVAL
AS REQUIRED

Exhibit 2-3 — Acquisition Milestones and Phases

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1997 STRATEGIC PLAN

U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES

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September 30, 1997

GOAL 6

STRENGTHEN THE NATION'S HEALTH SCIENCES RESEARCH ENTERPRISE AND ENHANCE ITS PRODUCTIVITY

Improvements in health are grounded on knowledge acquired through research conducted and sponsored by the Department of Health and Human Services (HHS) and other entities, both public and private. In the scope and quality of the science it sponsors, HHS sets the pace for the world in medical, epidemiological, behavioral, and health services research. It does so through strong, sustained public support for health sciences research.

The National Institutes of Health (NIH) plays a vital role in the nation's medical research enterprise. NIH-sponsored research generates knowledge that leads to improvements in the health and quality of life of the American public. It also provides a continually expanding knowledge base for the development of commercial products by the pharmaceutical, medical device, and biotechnology industries and by other key components of the national medical research infrastructure. Through its support of research training, the NIH provides the nation with highly trained scientists who rise to leadership in publicly funded research activities and in the biotechnology and related industries. To a significant degree, future improvements in the health of the American people depend upon sustaining both the research infrastructure that has been developed through NIH support and the basic principles that have enabled NIH research investments to be highly productive.

The Centers for Disease Control and Prevention (CDC) also conducts a strong program of epidemiological and population-based research to protect the public health and prevent and control disease, injury, and disability.

Finally, the Department's health services research plays a critical role by identifying what is most effective and cost-effective in day-to-day practice in community settings and by identifying the most efficient approaches for delivering and financing those services. Expansion in research investments across a broad front of scientific disciplines and operating divisions within the Department will do more than anything else to ensure improvements in health status and in the kinds and quality of services sponsored by the Department.

The Department also enhances the productivity of the nation's research enterprise through such means as international scientific cooperation and regulatory policies that encourage investments in research by the private sector.

Four principles are central to the Department's research investment strategy:

Basic Research. First is the high priority accorded to basic research in the life sciences and fundamental methodological work in health services research. In the area of life sciences, one need look no farther than the history of the biotechnology industry to see the wisdom of this approach. HHS investments in basic research undergird epidemiological, clinical, and health services research. In the case of the last, they have laid a foundation for better administration and reimbursement in both the public and the private sectors.

Investigator-Initiated Research. The second principle is the high priority accorded to sponsorship of investigator-initiated research. The Department traditionally has eschewed top-down direction for science and instead has relied primarily on individual scientists to propose and carry out specific research projects within the context of broad program goals and policy priorities enunciated by its agencies. As a result, HHS has been uniquely effective in harnessing the creative energies of scientists throughout the nation toward improving human health and well-being.

Peer Review. Third is the reliance upon peer review to assess the quality of research proposals and outcomes. Determining the relative technical merits of competing research ideas is one of the most difficult tasks facing any research agency. The Department's success year after year in directing investments to the most promising scientific opportunities and the most capable investigators stems largely from its commitment to seeking and heeding the advice of leading experts drawn from the pertinent scientific communities.

Research Capacity/Infrastructure. Fourth is the Department's commitment to sponsoring research in a wide variety of institutional settings and to encouraging a healthy research enterprise in the for-profit sector. Universities, not-for-profit research organizations, hospitals and other practice settings, small and large businesses, and government laboratories—each in its own way has provided a hospitable environment for important scientific initiatives. Also, in view of the unique role played by academic institutions, the Department will continue its efforts to help research-intensive universities remain strong. In particular, it will maintain its policy of paying a fair share of research costs and will collaborate with academic health centers to find ways to counter the destabilizing effects of managed care upon clinical research and the education of health professionals. Up-to-date and safe research facilities and equipment are essential to ensuring progress in medical research. The Department will continue its commitment to providing support for new and refurbished buildings and facilities for the conduct of medical research, as well as for the maintenance, renovation, and construction of facilities

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for HHS intramural research. Finally, the Department will enhance the base of highly qualified scientific investigators.

The Department reaffirms these principles as the core of its strategy to guide new investments to increase the nation's knowledge base about health science and maintain its quality. HHS intends to apply them even more broadly in the years immediately ahead. To guide action and measure progress in achieving its goal, the Department has established the following strategic objectives.

Strategic Objective 6.1
Improve the Understanding of Normal and Abnormal Biological Processes and Behaviors

Advancing the understanding of fundamental life processes is essential for progress in improving health and combating disease and disability. New knowledge of the biological and behavioral processes that operate throughout the lifespan affords the most powerful means for understanding the course of disease and how it can be delayed, treated, cured, or ultimately prevented.

Basic science studies matter at all levels of aggregation, from the materials we experience every day down to their most fundamental constituents. This progress leads to new scientific and technical knowledge and, years later, to innovative products and commercial profits. These advances have generated millions of high-skill, high-wage jobs and significantly improved the quality of life for Americans.[44]

The link between medical research and improving health is well illustrated by the vast new knowledge on the characteristics of various human genes that is accumulating almost daily. This research is providing many new concepts and tools for understanding the molecular mechanisms of various kinds of cancer and other chronic diseases; it is also opening the way to new avenues for prevention and therapy.

Strategy for Achieving Objective

HHS will advance its knowledge of biological and behavioral processes in these ways:

- sustaining its priority of investment in medical research;
- adhering to the investigator-initiated, peer-review model for selecting the highest quality research proposals;

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- implementing decision-making mechanisms and policies to ensure that medical research is responsive to emerging health needs, scientific opportunities, and new technologies; and
- promoting technology transfer through partnerships with industry that enhance the federal capacity for medical research and facilitate the flow of new technology. (This task will be accomplished through the development and implementation of policies, procedures, and guidelines that facilitate patenting, licensing, and cooperative research.)

Measures of Success

- The body of knowledge that has resulted in an improvement to the understanding of normal/abnormal biological processes and behavior.

New Legislation and Regulations

None.

Key External Factors

Progress in achieving this objective will be influenced by increasingly constrained resources for the scientific endeavor and the largely unpredictable nature of scientific discovery and advancement.

Strategic Objective 6.2
Improve the Prevention, Diagnosis, and Treatment of Disease and Disability

Medical research is yielding knowledge that can be translated into new and improved methods for detecting, diagnosing, and treating disease. New insights into normal disease processes will also provide the knowledge for developing preventive measures, which are the ultimate manifestation of improvements in health.

The importance of this research is summed up by a 1996 National Science and Technology Council report, *Technology in the National Interest.*[45] The report recognizes the contributions of medical research when it states, "[m]edical research supported by the National Institutes of Health has led to many discoveries that have improved both the health and quality of life of the American people. This is the NIH's foremost goal, but medical research also yields technological and economic benefits."

In addition, research at CDC is contributing to the understanding of pathogens and immunology and the basis for the prevention of the transmission of diseases.

Strategy for Achieving Objective

The strategy for achieving this objective parallels that for Objective 6.1.

Measures of Success

- Changes in the prevention or delay of the onset of disease and disability.
- Changes in the diagnosis of disease and disability.
- Changes in the treatments for disease and disability.
- Emergence of new or improved medical technologies and medical products such as vaccines, diagnostics, and therapeutics.

New Legislation and Regulations

None.

Key External Factors

The rate at which scientific findings are adopted by the private sector and translated into commercial products and processes affects the transfer of research findings into practice. Moreover, scientific discovery and advancement are inherently unpredictable.

Strategic Objective 6.3 Improve Public Health Prevention Efforts through Population-Based Research

Research addressed to controlling the spread of communicable diseases, eliminating the environmental causes of illnesses, and promoting health behaviors that forestall illness and premature death also is essential to HHS's efforts to improve the health and quality of life of the nation's citizens. Within the Department, the CDC is the focal point for population-based, public health research. This research is used by the Department and public health agencies throughout the nation to solve public health problems and improve the effectiveness of prevention programs. For example, research on the prevention of sexually transmitted diseases and childhood lead-poisoning, translated into public health practice, has significantly advanced the control of those diseases.

Strategy for Achieving Objective

The Department believes that continued investment in prevention research is essential to improvements in public health. Therefore, HHS will take these steps:

- sustain its priority of investment in population-based, public health prevention research;
- implement mechanisms to ensure that prevention research is responsive to emerging public health needs; and
- promote the collaboration between public health departments and academic institutions in the conduct of prevention research.

Measures of Success

- Number of new, innovative prevention strategies that are adopted into public health programs.
- Degree to which prevention objectives of Healthy People 2000 and 2010 are met.

New Legislation and Regulations

None.

Key External Factors

A number of external factors will strongly influence the accomplishment of this objective. They include such variables as changing public health needs, including the impact of new and re-emerging infectious diseases, and changing demographics, including the increasing elderly population and the growing incidence of chronic diseases. Increasingly, the prevention and treatment of diseases centers on behavioral changes, yet effecting permanent changes (such as reducing high-risk behaviors that can lead to disease and the adoption of health-enhancing behaviors) remains enormously difficult. Developing successful research networks with the participation of state and local health agencies, health providers, and academic institutions is necessary to carry out population-based research.

Strategic Objective 6.4
Increase the Understanding of and Response to the Major Issues Related to the Quality, Financing, Cost, and Cost-Effectiveness of Health Care Services

The nation's health care system is undergoing a dramatic transformation as a result of rapid mergers and acquisitions among hospital systems, pharmaceutical firms, health plans, and managed care firms. Health care delivery systems are larger and more complex; cost pressures are forcing innovation in how and where care is provided; and the population is getting older.

Health services research, which examines everyday practice in health care, is needed to assess the effect of current change and innovation on the cost, quality, and effectiveness of health care services. Many important questions need to be answered: Have the changes made a difference in who is getting care, how much care is being provided, or what types of services offered? What is the cost and quality of the care being provided? Which services are most cost-effective? How can research findings on effective treatments move more quickly into the everyday practice of providers? New methods and products for assessing quality of service, patient satisfaction, efficiency, and outcomes are also needed. Health services research is important in providing the analytical foundations for making payment reforms, especially in federal programs such as Medicare.

Strategy for Achieving Objective

HHS will increase its understanding and response to the major issues in health services through these means:

- investing in health services research;
- relying increasingly on the model of investigator-initiated, peer-reviewed research to identify key research questions and select the highest-quality research proposals through processes that include workshops and forums in cross-cutting areas of research, regular internal and external reviews, and review of the effectiveness of support mechanisms; and
- creating research partnerships with states and private sector organizations.

Measures of Success

- Availability of new tools and performance measures useful for assessing the quality of care provided in a range of health care settings, including measures of effectiveness of clinical care that recognize the role of patients in decisions affecting their treatment.
- Availability of new, useful knowledge about the impact of changes in the organization and financing of health care.
- Availability of new, useful knowledge about the cost and cost-effectiveness of alternative treatments for common, high-cost conditions, especially conditions affecting the Medicare population.

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- Availability of evidence about the relevance of research results and about the implementation levels of research results by the public, practitioners, and the health policy community.

New Legislation and Regulations

None.

Key External Factors

Collaboration with other federal agencies, as well as with states and the private sector, is essential to ensure that health services research is responsive to current and future challenges in the health care marketplace.

Strategic Objective 6.5
Accelerate Private-Sector Development of New Drugs, Biologic Therapies, and Medical Technology

One of the critical missions of the Department is to protect the public health. The Department performs this role in a number of ways, including the review and approval of new drugs and medical products developed by private sector research. The review and approval process, managed by the Food and Drug Administration (FDA), ensures the effectiveness and safety of the products being brought to the marketplace.

Recent public debate has questioned the length of time it takes for new health products to be developed and made available to the American public. The Department recognizes the tension between the need for a process adequate to protect health from dangerous or ineffective products and the benefits from moving products expeditiously to the marketplace. It nevertheless believes that the gains to health from accelerating research and development and marketing are compelling. The Department believes it is important to enhance the benefits to the public health by assisting the medical industry in accelerating the research and development process and in moving health products expeditiously to the marketplace.

Strategy for Achieving Objective

The Department envisions a multipart strategy, through the FDA to assist the private sector in reducing the time required to bring new drugs and medical products to market. Specifically, FDA will take these steps:

- Concentrate on, and give priority to, those products that have the greatest potential for health benefits and that address serious or life-threatening illnesses. This step will ensure the widest public health benefit from expedited reviews.

- Speed up all reviews by transforming the regulatory review process for new drugs and biologic therapies into an electronic, paperless system.

  This process will reduce the time and effort drug and therapy sponsors and FDA staff spend in preparing and handling large volumes of paper. For example, the average new drug application has about 250 volumes of information and occupies about 46 linear feet of shelf space. Besides saving time and costs, electronic handling will enhance reviewer productivity by increasing the speed and convenience of analysis, including risk-assessment supporting review decisions and the review process itself.

  In the risk-assessment phase, automation will improve understanding of the way a new drug or biological product works, and of its benefits and potential role in health care. In the review stage, electronic data handling will eliminate pounds of paper and make it easier for a reviewer to access information within the agency, as well as to communicate with the sponsor. The Department expects a direct correlation between the degree of automation achieved and the time saved in the review process—and, by extension, time saved by the industry in development.

- Increase and improve communication with sponsors. These improvements will help speed up sponsors' responses to FDA questions or concerns. By meeting with sponsors during the development of new products and the preparation of applications for review, FDA expects that applications will be complete and informative, thus reducing the down time now experienced while FDA reviews a completed application and prepares requests for clarification or additional information.

- Harmonize U.S. regulatory standards with those of other industrialized nations.

  Product sponsors will be spared the time and expense of preparing applications in different formats and with varied data and analytic requirements. Mutual recognition agreements will be used to promote a level playing field.

Measures of Success

- Average time spent in overall product development processes.
- Percentage of complete priority biologics license applications and new drug applications reviewed within six months after submission date.
- Percentage of complete standard biologics license applications and new drug applications reviewed within twelve months after submission date.
- Percentage of complete medical device pre-market approval applications reviewed within six months after submission date.

New Legislation and Regulations

Extension of the Prescription Drug User Fee Act is required to keep this objective on track. Many new regulatory standards will result from the harmonization process and will be integrated directly into the U.S. regulatory framework. Others will require new regulations.

Key External Factors

Outside factors that could affect the achievement of this objective include the health of the economy and its impact on the rate of industry's investment in the development of new medical therapies. The rate at which new medical technologies emerge will also affect the speed of the development process, and so will the complexity of these breakthroughs. The rate at which medical therapies will be developed will also be affected by the nature, scope, and severity of emerging health risks. Harmonizing regulatory standards will depend on the international community's coming to agreement on key issues.

Economic conditions, and the pace and direction of information and communication technology development, could have a bearing on FDA's ability to automate the review process and also on the ultimate configuration of automation. Economic conditions, particularly in the private sector, could affect the pace with which industry systems could be successfully articulated with the agency's systems. The direction taken by both information and communication technology over the next few years will influence the speed of automation and the configuration of automation.

Strategic Objective 6.6
Improve the Quality of Medical and Health Science Research by Strengthening the Base of Highly Qualified Scientific Investigators

The presence of a cadre of talented individuals in medical science and health services research is essential to improving the health of the nation. A robust and diverse research workforce—in laboratory, patient-oriented, population-based, and systems research—is central to carrying out the Department's mission and also to the vitality of present and future medical research enterprise and its associated industries.

Strategy for Achieving Objective

The maintenance, enhancement, and renewal of the scientific talent base require the operation of strong research training and career development programs, a commitment to the recruitment and retention of under represented groups into science, and the provision of a nurturing and stable research environment. To accomplish these aims HHS will take these steps:

- invest in research training programs at institutions and fellowships for individuals through the National Research Service Award program;
- support mentored research experiences for clinical, laboratory, and health services research scientists through research career development fellowships; and
- recruit minorities into medical research training and career development programs, starting with minority youth.

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Measure of Success

- Numbers of highly qualified persons, including minorities, pursuing medical and health science research, in accord with the estimates of need by the National Research Council for medical research.[46]

New Legislation and Regulations

None.

Key External Factors

A number of external factors are important to the success of research training efforts. Demographic factors that shape the pool from which future scientists can be recruited are very important. In addition, it is difficult to attract talented young people if they perceive that the job market in research is unstable or less financially rewarding than are fields of comparable interest. Thus, the constraint on resources for research limits opportunities for training and career advancement and discourages new entrants into basic science careers. Finally, the universities that provide the training opportunities are undergoing enormous changes that will influence their ability to support and nurture young researchers.

Strategic Objective 6.7
Ensure That Research Results Are Effectively Communicated to the Public, Practitioners, and the Scientific Community

The expeditious communication of research results is a vital step in translating new knowledge into changes in medical practice and into technologies that improve human health and well-being. Effective communication of research findings drives scientific innovation, fosters new discoveries, and ensures that public investment in research yields new methods of prevention, diagnosis, and treatment.

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Strategy for Achieving Objective

Adopting and using effective communication practices will be the core of the strategy to achieve the objective HHS will use these practices:

- routine preparation and dissemination of information on scientific advances and technologies to individuals and to medical, scientific, industrial, media, and patient groups;
- wide dissemination of the results of supported research through various information channels, including scientific publications, workshops and symposia, scientific meetings, consensus-development conferences, press releases, special physician and public education programs, clinical alerts concerning immediate health and safety issues, and electronic databases; and
- prompt responses to inquiries from the public, health professionals, the Congress, and the media through information offices, clearinghouses, electronic databases, Internet-based information services, publications, and press releases, as well as through letters and telephone calls.

Major improvements have already been accomplished through recent initiatives such as providing free public access to Medline—the world's most extensive collection of published medical information—over the World Wide Web. All Americans can now access timely and accurate medical information on the Web at http://www.nlm.gov. Consumer-focused information advances include *Healthfinder*, launched by the Department in April 1997. *Healthfinder* offers easy access to high-quality consumer health information from federal and private sources at http://www.Healthfinder.gov. The Cancer Information Service (CIS), an award-winning program, provides the latest, most accurate cancer information for patients, their families, the general public, and health professionals, responding to calls in English and Spanish. These are illustrative of the ways HHS intends to take advantage of the opportunities of the Internet and other communication technology to bring the results of research within easy reach of practitioners and the public.

Measures of Success

- Improvements in communication on information about research discoveries, new therapies, and actions that individuals can take to protect and improve their health.

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- Improvements in dissemination of research findings and emergency or critical information learned from medical and health services research.

New Legislation and Regulations

None.

Key External Factors

The pace of advances in information technology is a key factor in improvements in communication. The capacity of national Web resources will limit public access to and use of HHS-sponsored resources. The success of efforts to connect schools, libraries, and other public facilities to the Web will also set the pace for public access to these information sources.

U.S. Department of Education

Strategic Plan, 1998-2002

September 30, 1997

The Department of Education's Mission
To ensure equal access to education and to promote educational excellence throughout the nation.

Objective 1.4: A talented and dedicated teacher is in every classroom in America.

Performance Indicators

25. *The percentage of teachers and principals across the nation who are rated by supervisors, parents, and peers as very effective will increase annually.*
26. *Throughout the nation the percentage of secondary school teachers who have at least a minor in the subject they teach will increase annually.*
27. *The percentage of qualified new teachers who leave the profession within the first 3 years will continuously decrease.*
28. *The number of nationally board certified teachers will increase to reach 105,000 by 2006.*
29. *By 2002, 75% of states will align initial teacher certification standards with high content and student performance standards.*

A talented, dedicated, and well-prepared teaching force is one of the most important ingredients for education reform. Research indicates that teachers' knowledge and skill make a crucial difference in what students learn. Research also demonstrates the value of intensive and sustained high-quality professional development when developing skills in new models of teaching and learning. The current teaching force needs high-quality professional development if all teachers are to be able to teach a diverse student population to challenging standards. Further, new teachers must be well prepared to help diverse learners master challenging content and performance standards. It is estimated that about one-fourth of newly hired teachers lack the qualifications for their jobs. There is also high turnover in beginning teachers—22% of beginning teachers drop out of the teaching profession within the first three years. Key reasons include lack of support and typical "sink or swim" approaches to induction.

Core Strategies

- **Improving the quality and retention of new teachers.**
  - Support programs to recruit talented people from all backgrounds into teaching.
  - Improve the quality of teacher education for new teachers.
  - Encourage and support special efforts to retain new teachers.
  - Support career ladders that will enable bilingual paraprofessionals to become certified teachers.
- **Financial support and interagency coordination.** Provide funds to states and schools through the Eisenhower and Individuals with Disabilities Education Act (IDEA) professional development programs, as well as other programs in which professional development is an allowable activity (e.g., Title I, Vocational Education, Bilingual Education, and Technology Literacy Challenge Grants). Coordinate with the National Science Foundation to implement strategies to improve the skills of teachers through the professional development programs of both agencies.
- **Licensing standards.** Through the Partnership for Excellence and Accountability in Teaching, support states' efforts to align licensing and certification requirements with challenging content standards and performance-based assessments.
- **Teacher recognition and accountability.** Support the National Board for Professional Teaching Standards and programs that reward good teachers and address the problems of incompetent ones.
- **Workplace knowledge.** Promote public-private sector partnerships, such as industry-based internships, that increase teachers' knowledge and skills of the changing workplace.
- **Research, development, evaluation, and dissemination.**
  - The National Evaluation of the Eisenhower Professional Development Program will evaluate the program's alignment with high state standards and principles of duration and intensity.
  - Provide educators and policymakers with valid, research-based strategies for improving quality.
  - Increase support for quality teaching and professional development among government, business, community leaders, and the general public through outreach and dissemination of information.
  - Establish the Partnership for Excellence and Accountability in Teaching to work with stakeholders and carry out applied research.
  - Establish a Teacher Policy Center to conduct research on policies related to teaching.
- **Monitoring trends.** Issue a biennial national report card on teacher quality starting in 1998.

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Objective 1.6: Greater public school choice will be available to students and families.

Performance Indicators

35. *By 2002, 25% of all public school students in grades 3-12 will attend a school that they or their parents have chosen.*
36. *By 2001 a minimum of 40 states will have charter school legislation.*
37. *By 2002 there will be 3,000 charter schools in operation around the nation.*
38. *School districts will increasingly make choice available to their students through magnet schools, charter schools, and open enrollment policies.*

Research on public schools that provide choice suggests that the sense of ownership by school staff, students, and parents helps to galvanize effort towards common goals. Information on the educational effects of choice programs is limited; most charter schools are just getting started. Further work needs to be done on documenting the implementation and quality of public schools of choice and sharing the most promising strategies with the field.

The Department of Education is encouraging expansion of choice within the public school system with alternatives such as charter schools, magnet schools, and systemwide strategies that make every public school a school of choice, thereby enabling all students and their parents to choose their school.

- Charter schools are intended to give teachers, parents, and other members of local communities the flexibility to experiment with innovative methods of achieving educational excellence. At the same time, they should help all students have access to quality schooling. Because they are new schools, charters require start-up funds and support that the Department helps to provide through its Charter School program.

- For several decades, magnet schools have provided the most widespread opportunity for families to exercise choice. The Department's Magnet School program provides support for magnet schools that are intended to achieve desegregation goals, particularly in our largest cities.

Core Strategies

- **Engage the public**. Expand support by the public and policymakers for the development of high-quality charter and magnet schools.
- **Financial support and technical assistance**.
  - Through the Charter Schools Grants program, help states and schools effectively plan and implement charter schools that have flexibility from state and district rules, are open to all students, and are held accountable for improving student achievement.
  - Continue to support implementation of magnet schools through grants to school districts under the Magnet Schools program, providing opportunities and choice for students and promoting desegregation within high-quality education settings.
- **Research and development**. Support research on public school choice, including evaluations of the effectiveness of charter schools and magnet schools, and promote the development of models and materials to help parents, teachers, and communities to design effective school choice programs.
- **Outreach**.
  - Disseminate information on strategies for expanding high-quality school choice programs that improve student achievement and share lessons learned from research about school choice.
  - Increase awareness and support for effective public school choice programs among government, business leaders, and community leaders, and the general public through outreach and dissemination of information.

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Objective 1.7: Schools use advanced technology for all students and teachers to improve education.

Performance Indicators

39. *Students who have access to high-quality educational technology will show improved achievement in core academic subjects and improved technological literacy.*
40. *The ratio of students per modern multimedia computer will improve to 5:1 by 2001.*
41. *The percentage of public school instructional rooms connected to the Information Superhighway will increase from 14% in 1996 to 25% in 1998, and higher percentages thereafter.*
42. *At least 50% of teachers will integrate high-quality educational technology, high-quality software, and the Information Superhighway into their school curricula, by 2001.*
43. *Students in high poverty schools and students with disabilities will have access to advanced technology (including assistive technology for students with disabilities) that is comparable to that in other schools by 2001.*
44. *At least 60% of teachers, school administrators, and school librarians will have been trained on use of computers and the Internet to help students learn, by 2001.*

Hundreds of studies have found that, when properly used, technology improves many aspects of education, including student learning, teacher professional development, classroom management, and school administration. As an instructional tool, technology helps students master basic skills, solve complex real-life problems that require advanced skills, and prepare for the world of work.

Few schools have adequate numbers of modern computers or access to the Internet, and relatively few teachers are prepared to use technology effectively. Further, access to computers and other technologies is not enough; integration of technology into the curriculum is also needed. We must create an infrastructure that will enable all students to leave school with the technology skills needed for work and further education. Finally, we must encourage development of software and universal design interfaces that make advanced technology fully accessible to students with disabilities.

Core Strategies

- **Technology connections, especially for high-poverty schools.**
  - Use the Federal Communications Commission's Universal Service Fund discounts and "NetDays" to wire schools for using educational technology and to connect them to the Internet.
  - Encourage use of technology connections, such as voice mail, faxes, and e-mail, to stimulate communication between families, communities, teachers, and schools.
- **Access to modern computers and other technology.**
  - Encourage local, state, federal and private sector partnerships to provide access to modern computers for all teachers and students, including those in high-poverty schools.
  - Provide financial support through the Technology Literacy Challenge Fund and other programs to states and districts to plan, purchase, and use modern computers and other educational technology.
  - Support development, dissemination, and use of assistive technology that enables students with disabilities to participate fully in education programs. Key programs include research by the National Institute on Disability and Rehabilitation Research and support from the Assistive Technology program and IDEA.
- **Effective software.** Using state and local standards as guides and building on research and development of effective practices, including those developed with support of the Technology Literacy Challenge Grants, work with the private sector to develop effective and engaging software and on-line learning resources as an integral part of school curriculum.
- **Program coordination.** Through our technology initiative, coordinate Department technology programs (Technology Challenge programs, regional consortia, Star Schools, IDEA technology and media services, assistive technology, Ready-to-Learn Television, and telecommunications math

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programs); other programs that can support technology, such as Title I and IDEA; and programs and services in other federal agencies such as the National Science Foundation.

- **Professional development**. Building on new teaching standards, support teacher training through federal programs such as Eisenhower Professional Development, Technological Literacy Challenge Fund, Star Schools, Bilingual Education, Vocational Education, and Title I programs, and by working with the National Science Foundation. In partnership with states, local districts, and the private sector, create new incentives and approaches and provide technical assistance that will help teachers use technology more effectively.

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Objectives, Indicators, and Strategies

Objective 2.1: All children enter school ready to learn.

Performance Indicators

1. *Kindergarten and first grade teachers will increasingly report that their students enter school ready to learn reading and math.*
2. *The disparity in preschool participation rates between children from high-income families and children from low-income families will decline year by year.*
3. *The percentage of children from birth to five years old whose parents read to them or tell them stories regularly will continually increase.*

Recent research has highlighted the importance of the earliest years of life for children's later success. Children's early learning experiences, or lack of them, have consequences that extend into the long-term. Research on early brain development reveals that if some learning experiences are not introduced to children at an early age, the children will find learning more difficult later. Furthermore, children who enter school ready to learn are more likely to achieve to high standards than children who are inadequately prepared. High-quality preschool and child care are integral in preparing children adequately for school.

Core Strategies

- **Interagency coordination, including services integration**. Support children at risk of early school failure by coordinating with the Department of Health and Human Service's (HHS) Head Start program, HHS' and Department of Agriculture's nutrition support programs, and other federal programs and services for young children to ensure that their needs are met and to reduce the burden on families and schools of working with multiple providers.
- **Financial support for children who are educationally disadvantaged or have disabilities.** Provide resources to states and local school districts under Title I for preschool programs and Even Start, and to states and local providers under the Individuals with Disabilities Education Act (IDEA) for programs aimed at infants and toddlers and preschool children with disabilities or at risk of developing disabling conditions.
- **Research, development, and technical assistance**.
  - Identify, evaluate, and encourage the use of programs for young children that make use of the latest research on early brain development, early intervention, and high-quality nurturing.
  - Develop, field test, and evaluate models of effective practice through such programs as Even Start that can be shared with local Head Start, Title I preschool, and IDEA preschool projects and with states, local districts, and community-based organizations.
  - Work with experts to develop an agreed-upon definition of school readiness and to establish a core set of standards that Even Start, Title I preschool, and IDEA programs will use with preschoolers.
- **Development and dissemination of easy-to-use kits for learning at home**. Support family practices that encourage early learning by developing and disseminating educational materials for parents and their young children, such as the Ready*Set*Read Early Childhood Kit.
- **Development of readiness indicators**. Develop indicators of young children's knowledge and school readiness by working with HHS and other organizations, incorporating measures from the Early Childhood Longitudinal Study and other studies of children's school readiness.

Objective 2.2: Every child reads independently by the end of the third grade.

Performance Indicators

4. *Increasing percentages of fourth-graders will meet basic, proficient, and advanced levels in reading on the National Assessment of Educational Progress (NAEP).*
5. *At least 25% of students will participate in the national reading test by spring 1999; increasing percentages thereafter will participate.*
6. *By 2001 the America Reads Challenge corps will prepare tutors for 3 million children, including at least 100,000 college work-study tutors annually. (Legislation needed.)*
7. *Increasing percentages of teachers of kindergarten through third grade will complete intensive professional development to enable them to skillfully teach reading.*

In 1994, 40% of fourth-graders failed to attain the basic level of reading on the National Assessment of Educational Progress and 70% did not attain the proficient level. Although reading problems are particularly severe for disadvantaged students, students with reading difficulties represent a cross-section of American children. As more and more jobs require better reading skills, many students will have to improve their reading skills.

The Department's existing programs make a vital contribution to the reading success of young children. Title I of the Elementary and Secondary Education Act provides reading services to millions of children each year. The Individuals with Disabilities Education Act and bilingual education funds under Title VII also support reading services for children. Although teachers and schools have the critical responsibility for literacy, studies find that sustained, individual attention and tutoring after school and over the summer can raise reading levels when combined with parental involvement and quality school instruction.

Core Strategies

- **Legislation.** Work with Congress to pass the America Reads Challenge legislation.
- **Financial support for children with special needs**. Provide in-class reading instruction with upgraded standards and curriculum—especially for children in kindergarten through third grade. Key programs that support reading instruction include Title I Grants for Disadvantaged Children, Bilingual Education, the Individuals with Disabilities Education Act, and Even Start.
- **Voluntary national test**.
  - Support the development and effective use of a national, voluntary test in reading so that parents, teachers, and communities have a benchmark for children's progress.
  - Provide accommodations for students with disabilities and limited English proficiency in taking the national test, including providing reports for parents in English and several other languages.
- **Public information**. Provide information via the world wide web and other means to bring about an understanding of what it means to read independently and share strategies that teachers, parents, and others can use to help students achieve this goal.
- **Community partnerships**. Encourage community partnerships that sponsor reading tutors (the America Reads Challenge, Read*Write*Now, Parents as First Teachers, and college work-study).
- **Research and development**.
  - Support state-of-the-art research—including a reading center—to test, validate, disseminate, and encourage the use of effective approaches to reading instruction and tutoring, especially for students experiencing difficulty with reading.
  - Coordinate with reading research conducted for children with learning disabilities by the National Institute for Child Health and Development (NICHD).
- **Evaluation and performance measurement.** Through evaluation studies and support to improve state and local performance data systems, provide useful information on how states and communities are doing in improving children's reading.

Objective 2.3: Every eighth-grader masters challenging mathematics, including the foundations of algebra and geometry.

Performance Indicators

8. *More eighth-graders reach the basic level or higher levels of proficiency in math on the National Assessment of Educational Progress; on international assessments, at least 60% will score at the international median by 2002, and at least 15% will be in the top 10% by 2002.*
9. *At least 25% of students will participate in the national math test by spring 1999; increasing percentages thereafter will participate.*
10. *Each year, more new teachers will enter the workforce with adequate preparation to teach challenging mathematics to students in kindergarten through eighth grade.*
11. *Each year, more teachers in grades 5-8 will complete intensive professional development to enable them to teach challenging mathematics.*
12. *Each year, increasing numbers of schools will have access to and use information on best practices for math instruction.*

Mathematics is a basic skill—the gateway to learning many more advanced skills, the language of technology and science, a tool for analysis and problem solving, and a prerequisite for success in a wide variety of careers. Leading employers emphasize the need for U.S. students to excel in quantitative and problem-solving skills in order to succeed in the workplace. Math, like reading, has a key academic turning point; for math this occurs around eighth grade. Eighth-graders are often put on different tracks that they follow through high school and even beyond; math often determines what that track will be.

Notwithstanding math's importance, U.S. students fail to achieve to the high standards needed for math success. The recent Third International Mathematics and Science Study (TIMSS) showed that although U.S. fourth-graders perform above the international average in math, our eighth-graders scored below the international average. The study also showed that we do not expect eighth-graders to master material as challenging as the material that students in high-performing nations master by that grade.

Core Strategies

- **Voluntary national test.**
  - Support the development of a national, voluntary test in math so that parents and communities have a benchmark for their children's progress.
  - Use the test as a means of encouraging schools, districts, states, business, and communities to improve math curricula, instruction, teacher training, and professional development.
  - Provide accommodations for students with disabilities and limited English proficiency in taking the test, including providing reports for parents in English and several other languages.
- **Professional development programs.** Strengthen the Department's existing programs that support teacher preparation and upgrading teacher skills for math instruction—especially for teachers of fourth through eighth grades—such as Title I of the Elementary and Secondary Education Act, the Eisenhower Professional Development program, and the Individuals with Disabilities Act Professional Development.
- **Challenging standards.** Promote upgraded standards and curriculum for math instruction through Goals 2000, the Eisenhower Professional Development program, and Title I of the Elementary and Secondary Education Act, and by working with the National Science Foundation.
- **Public information.** Increase public understanding and support for mastering challenging mathematics by the end of eighth grade through partnerships with key education, mathematics, and professional organizations; further collaborative activity with the National Science Foundation; and providing concrete information about what students should be able to do in mathematics.
- **Research, development, and dissemination.** Based on state-of-the-art research, develop high quality materials on effective practices and tools for improving math curriculum, professional development, software, instruction, and family and community support; widely disseminate these materials; and promote the use of these materials by states, schools, teachers, and families.

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Objective 2.4: Special populations receive appropriate services and assessments consistent with high standards.

Outcome indicators for children and youth in special populations are included throughout Goals 1 and 2 and especially in the key outcome indicators for elementary and secondary education on page 15.

Performance Indicators

13. *States will implement appropriate procedures for assessing and reporting progress towards achieving to high standards by students who have disabilities, are limited English proficient, or are children of migrant workers, by 2001.*
14. *The number of schools using comprehensive, research-based approaches to improve curriculum, instruction, and support services for at-risk students will increase annually.*
15. *Increasing percentages of administrators and educators working with at-risk children will have access to and use high-quality information and technical assistance on effective practices provided by Department-sponsored technical assistance and research centers as well as through professional associations and publications.*
16. *Increasing percentages of teachers will be equipped with strategies to enable students with limited English proficiency or disabilities to meet challenging standards.*
17. *Federal technical assistance and other support to states will result in annual increases in the number of states and local school districts with the capacity to disaggregate and report out assessment data aligned with standards for at-risk students.*

At-risk children need the same high quality schooling that is our goal for all students plus extra supports to help them succeed. These children may include students with limited-English proficiency or disabilities, migrant students, students in high-poverty schools, and others who are the focus of federal programs. Federal support is critical to ensuring that these students are not left behind in the drive for higher standards. Working to enable at-risk children to reach the high standards expected of all students must figure prominently in reform efforts. Whole-school approaches or targeted interventions must be based on the best research and promising practices from the field. Assessment of our nation's progress must be measured in terms of not only how well states, districts, and schools perform overall, but also in terms of how at-risk students fare.

Core Strategies

- **Challenging standards in federal programs**. Work with states and districts to ensure that the standards set for students served by federal programs are the same challenging standards set for all children through providing technical assistance, guidance, and models of effective implementation of challenging standards.
- **Assessment with accommodations**. Promote the development of assessments aligned with high standards that make appropriate accommodations for children with disabilities and limited English proficiency.
- **Financial support**. Provide significant resources to states, local school districts, and other education providers to improve achievement for children with special needs and assist states in providing education that meets civil rights requirements for free and appropriate education. The Department funds major programs aimed at disadvantaged children or children with disabilities, including:
  - Title I of the Elementary and Secondary Education Act (education for disadvantaged children)
  - Migrant education programs
  - Title I program for neglected and delinquent children
  - Programs for homeless children and youth
  - Indian education
  - Bilingual education
  - Individuals with Disabilities Education Act (IDEA) program
- **Research, development, dissemination and technical assistance on promising practices**. Support and share research on the most promising practices through the research institutes and R&D centers of

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the Department's Office of Education Research and Improvement (OERI), Office of Special Education and Rehabilitative Services (OSERS), the Office of Bilingual Education and Minority Languages Affairs (OBEMLA), and the Department of Health and Human Services' National Institute of Child Health and Human Development (NICHD) to focus on strategies for teaching and assessing children with special needs. In particular, provide technical assistance and disseminate information on including children with disabilities in the general curriculum in the least restrictive environment.

- **Professional development**. Support professional development that equips teachers with strategies to enable students with limited English proficiency or disabilities to meet challenging standards. Key programs include professional development programs sponsored under the Individual with Disabilities Act and Bilingual Education Act, as well as that provided under Title I.
- **Evaluation and continuous improvement**.
  - Conduct evaluations of federally supported programs to determine the extent to which new program provisions support standards-based reforms and continuous improvement to help students meet challenging academic standards.
  - Use evaluations to inform continuous improvement of programs.

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Objective 4.3: An up-to-date knowledge base is available from education research to support education reform and equity.

Performance Indicators

10. *Peer reviews will increasingly show that education research and statistics supported by the Department are of high quality, are focused on critical education reform issues, and contribute significantly to educational improvement.*
11. *Education research will increasingly meet the needs of our partners (e.g., states, schools, institutions of higher education, national associations) and our customers (teachers, parents, students, business) for reliable information on how to make schools more effective, as measured by biennial customer surveys.*
12. *In major and selected other programs, increasing percentages of grantees will demonstrate that their programs and services are based on sound research results.*
13. *Dissemination of research and assessment findings will increasingly reach key customers and result in educational improvement.*

Investing in education research and evaluation contributes to our understanding of and efforts to improve education. Because of its potential to influence the well-being of the nation's youth, education research must meet the highest professional standards of scientific inquiry so that results are trustworthy. The Department, in collaboration with the National Educational Research Policy and Priority Board, is developing standards to assure that supported activities are of the highest professional excellence. To ensure its relevance and application, research must remain firmly rooted in the everyday experience of students and teachers and the reality of schools. The Department also supports a variety of national dissemination activities that make available to educators, parents, and policymakers—as well as ED program staff—the best research-based information on educational practice.

Core Strategies

- **Statistics.** Collect and effectively disseminate statistics on critical education issues used to inform the national research agenda and provide information for policy-making and program improvement.
- **National vision and priorities for research.**
  - Develop a comprehensive vision of the nation's needs for knowledge about education, and set clear priorities for education research to meet those needs.
  - Coordinate research, development, and evaluation activities across the Department and with other federal agencies, such as the National Science Foundation and HHS institutes.
- **Financial support for R&D.** Support research on education reform and improvement through such programs as the national education research institutes and centers, regional educational laboratories, National Educational Research Policy and Priorities Board, National Institute for Disability and Rehabilitation Research, IDEA Research to Practice program, National Center for Research in Vocational Education, and the International Education and Foreign Language Studies program.
- **Research quality.**
  - Ensure that Department-supported research and development meet the professional standards of the scientific community and are applied systematically and with rigor.
  - Develop and utilize knowledge about education systems and practices in other nations to stimulate educational improvement in the United States.
- **Research dissemination and use.**
  - Develop and implement a comprehensive dissemination system of effective practices that increases the education community's access to and use of research-based products and services.
  - Ensure that teachers, parents, and principals can obtain help in solving their school-related problems.
  - Review and give feedback on the extent to which the Department's grantees propose programs and services that are based on sound research results.
  - Ensure that research and program evaluation findings are given to program offices to improve program design and implementation.

DRAFT

A REVIEW OF THE FEDERAL ROLE AND THE DEPARTMENT OF EDUCATION STRUCTURE

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A REVIEW OF THE FEDERAL ROLE AND THE DEPARTMENT OF EDUCATION STRUCTURE

This fourth and last of four background papers for the Research, Development and Dissemination System (RD&D system) Committee of the National Educational Research Policy and Priorities Board (NERPPB) provides a summary review of the federal role in research (and specifically educational research) and the structure (organization and processes) for fulfilling the role in the U.S. Department of Education (ED).

This paper is based in part on: the 1992 review by a panel of the National Research Council (NRC), *Research and Education Reform, Roles for the Office of Educational Research and Improvement;* the 1991 review by a committee of the National Academy of Education (NAE), *Research and the Renewal of Education;* the current law; selected commentary; and a recent review of the Department's knowledge building processes and its Planning and Evaluation Service (Morrill & Weiss, *Talent, Tensions and Transition, An Organizational Analysis of the Planning and Evaluation Service,* February 1997). It is also grounded in its author's experience and analysis of RD&D activities within and outside of the federal government.

The review begins with consideration of the appropriate federal role, turns next to the effectiveness of the ED structure and concludes with implications of the analysis for the Board's Congressional report.

I. The Federal Role

To set a proper context for examination of the federal role in educational RD&D, we begin with a summary of the theory and concepts determining appropriate federal activity which have been applied in American governance with varying degrees of rigor over time, and which have gradually assumed a more expansive view.

The historic baseline has been to limit the intervention of all governments to undertaking only those activities whose purposes are unattainable in the desired amount or quality through private action and where the public benefits equal or exceed the public costs of production. Through this lens, education – particularly elementary and secondary education – has long been regarded in the economic and political science literature as a public good. The benefits to the society of an educated citizenry for economic, social and aesthetic reasons have long had substantial acceptance among scholars and the general public alike. Notwithstanding current debate about the broader introduction of private provision of K-12 education with public money (e.g., vouchers), the consensus about the need for public education financing remains intact.

The second threshold question once public action is judged appropriate, is the determination of the appropriate level of public intervention – local, state, federal, or some combination thereof. Traditional American political doctrine would remand the public intervention to the lowest level where the function can be effectively performed. Economic analysis would examine whether the benefits realized are local, regional or national in determining where the costs should fall. On these grounds, there is a basis for funding shared benefits at all three levels, with the higher the level of educational attainment justifying a larger contribution from higher governmental levels, since local government usually doesn't capture the full benefits of higher education of its resident children. This conceptual framework has, in general, been followed in support of education, with the state and local governments carrying most of the K-12 financial load, and the federal and state levels carrying most of the public postsecondary burden, beyond costs carried by individuals.

In addition to the criteria outlined above, there is another set of criteria in assessing federal involvement applicable to the kind of activity being undertaken. This additional criterion also has its roots in economic cost and benefit notions as well as political science concepts. Activities can be seen in a continuum from research and information at one end, through to directly provided federal services or income transfers at the other end. In this continuum, research and information are the most easily justified as a federal role and the direct interventions the hardest to justify. Justification of the research and information roles involve analysis of whether research and information needed for service improvement or consumer choices are available from either private or other public parties. And in the absence of other sources, federal research and information activity is considered warranted.

This conceptual framework has had broad application across the federal government, influencing involvement and levels of expenditures from relatively high proportionate levels in defense, space, substantial but not all dimensions of health, down to activities where few or no federal investments are made because of commercial or other alternative sponsorship of appropriate R&D. Against this criterion, educational RD&D should be highly ranked in eligibility for federal support.

Given the public nature of the enterprise – particularly K-12 – and the difficulty of capturing all but the most applied research benefits in particular institutions, the case for RD&D sponsorship from public and philanthropic sources is strong. Further, locating the bulk of public sponsorship at the federal and state levels is warranted given budget constraints, skill limitations, efficiency considerations and the inability to capture enough of the benefits of the research at the school district level. Also unlike the drug companies, educational vendors have limited capacity or economic base for large R&D investments.

This is not to say that state and local government, educational vendors, and foundations do not have an important interest and stake in educational RD&D. They do, and their role in each case, including financial contributions, should be stronger. It is to suggest, however, that the existing structure beyond the federal government does not encourage large step-wide changes in sponsorship of educational RD&D without very large changes in the underlying financing system and incentives, which seem unlikely in the critical next 5-10 years. Only in the case of philanthropic giving does significant adjustment seem plausible, and probably only if there is an accompanying increase in federal funding.

The foregoing suggests that there is a conceptual base and justification for a much larger federal role and federal financial support level in educational RD&D than now exists.

Intellectually competent reviews over the past decade (NAE, NRC and the President's Committee of Advisors on Science and Technology (PCAST)) have called for such significant increases. In earlier papers, we have discussed some of the reasons for lack of response; here, we need to examine the non-response in terms of the federal role.

On those terms, the federal role in educational R&D has primarily run into difficulty over the presumed linkage between sponsorship of research and information on the one hand and the direction of operational activities on the other, with particular focus on curriculum. Americans have long held strong views against federal operational control of K-12 schooling, in sharp contrast with a number of European democracies and other countries. The presumption holds that federal sponsorship of research (or testing for that matter) will lead inevitably to operational control inclusive of curriculum, a possibility so problematic as to warrant foregoing the research altogether. Adults know "what worked" or didn't for them, worry about school competition in the values of their children, and are perhaps unimpressed with the science base of education research.

This argument is further muddied by concerns about "politicization" of the research, a concern that the research community as well as the political (Congressional) community shares. While certainly not the only barrier to more vigorous federal educational R&D, it is generally recognized as an important one.

It is interesting to see where and how this kind of concern exhibits itself in federal R&D and where it does not, and speculate about the causes.

- This objection does not occur in many other highly decentralized activities in which operational control is firmly vested in the operational level. Health and agriculture are both highly decentralized activities in which federal research plays a strong, if not dominant role. It is to be noted that the health system also deals with children; and in other social services, federal R&D is not regarded as an anathema. Perhaps this is due to the fact that the health system primarily fixed bodies, not minds.

- Even in education, there is a differential set of standards applied. With respect to special education and vocational rehabilitation, very substantial federal sponsorship exists and in the case of NICHD, is warmly supported even by the House Committee on Education and the Workplace.

- Work on math and science education including curriculum by NSF receives support by the Congress, as does educational research in other mission agencies.

These examples suggest that something more or different from the traditional concern about federal involvement in decentralized operational activities are at work, even in the educational R&D area. Some of the candidate factors which cause the hostility to federal educational R&D when sponsored by OERI might include:

- A mind set among the lay public and political community that there is nothing fundamental or very useful to be learned from educational research that can help educational performance. In this view, it's all a matter of minor applied tinkering and fads and not worth very much; and/or

- The educational problem in the country except at the urban and rural fringes is in good shape, and the fringes are not very important or remedial with research; and/or

- The quality of educational R&D management and performance is so poor as to be worth relatively little support; and/or

- The ED oversight of federal R&D is so couched in partisan rather the substantive research terms that it is not to be trusted with resources since they will merely initiate the next fad, a fire that the research community itself often fans.

These alternative sources of explanation for less support for federal educational R&D than might otherwise be the case are all unpleasant and at least partially untrue. They, nonetheless, constitute a formidable barrier which needs to be confronted and a strategy developed, if a change in the vigor, direction and size in federal educational research is to be achieved. That such a change is possible from a position of substantial criticism can be seen in the progress in NCES over the past decade.

While approaches to the first three alternative and speculative causes of the suboptimum circumstance will show up in the last section, it is appropriate to deal with the "politics" issue here as an analytical matter. Initially touched upon in the second background paper (*The Needs, Demand For and Supply of Educational Research, Development and Dissemination*, February 27, 1998, pp. 9-10), the political concerns often are directed at higher levels of the Department and executive branch in the form of alleged improper intrusions into matters of agenda, technical choices, and other details of scientific merit. Some, but not all, intrusions are improper; the Congress is at least as large a transgressor as the executive branch in micro-management; and the efforts to "wall-off" elected and appointed sponsors from substantive policy guidance is a losing strategy not practiced by effective research managers.

- Neither senior executive branch officials nor the Congress should have a direct role in project selection, evaluations, or other issues of technical merit.

- Both senior executive branch officials and the Congress should abandon or curb their predilection for detailed allocation formulas and authorization of large-scale demonstration of untested and unresearched concepts and innovations.

- Both senior executive branch officials and the Congress, however, should appropriately be involved in the policy issues of setting research priorities, broad policies and learning agendas in response to proposals of senior research managers. These are appropriate roles for sponsors, and effective research managers elsewhere

These are appropriate roles for sponsors, and effective research managers elsewhere make positive use of their participation.

II. The Departmental Structure

Reorganization or "moving the boxes around" is among the most popular activities in Washington, and it has been practiced on OERI – the central entity for educational RD&D – with regularity and excruciating detail by all interested parties, most particularly the Congress. Unfortunately, experience across the federal bureaucracy suggests that reorganization alone is among the least effective ways to produce the desired change for which it is undertaken. Without accompanying clarification of mission, improvements in approach and process, adjustments in skills, staffing and resources, and wise strategies, reorganization is a hollow shell.

The present OERI organizational structure owes much to the NRC and NAE reviews of the early 1990s even after those ideas had been pushed through the compromising process of federal legislative enactment. The NRC organizational prescription was particularly detailed and explicit; and much of it survived into law, without, it should be noted, much of what it had to say about staffing and financial resources. These structured reviews were complemented by similar prescriptions from informed scholars (see Hawley, 1990; Wise, 1990). It is striking to read the remarks of representatives of this same group of informed observers in the immediate aftermath of the legislative enactment in 1994 directed to a common set of questions about next steps beyond the legislation (Sroufe, et al., 1995). Those comments were focused on expansive dreams for educational RD&D at the federal level, instruction to stakeholders about their desired behavior, and very little discussion of how the reorganization would help achieve those goals or how the absence of other prior prescriptions were likely to diminish the chances of achievement.

Before discussing the structural issues applicable to OERI in particular, it is appropriate to begin with the structure and processes of the Department as a whole. The organizational structure is thoroughly conventional and similar to many other domestic agencies. The Secretary is equipped with the normal set of alter egos – a Deputy and an Under Secretary – and staff offices, among them an analytic shop (the Planning and Evaluation Service). There are an array of program assistant secretaries with particular functional responsibilities and programs to run. And there is an assistant secretary for R&D, and a separate and especially insulated information gatherer (NCES).

There are two features that distinguish the ED structure from many other agencies. The first is the insulation that several programs have – with statutory backing – to protect them from the Secretary and Secretarial action with respect to direction and resources. These include special education, vocational rehabilitation and research. The discussion will return later to research; but with respect to the other two, the underlying intent appears to be program protection and autonomy. Both have substantial R&D programs beyond the normal amount of knowledge building capacity, demonstration efforts, and dissemination activities (technical assistance) which program assistant secretaries should and usually do have. (See Morrill & Weiss, 1997 for further discussion). The insulation goes so far as to preclude evaluation activity by the Planning and Evaluation Service in special education.

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The second anomaly has been, until recently, the absence of any planning process to pull the knowledge-building components of the Department together into a cohesive and coordinated strategy to develop the knowledge needed by the field and the Department for sound policy and operational improvement. In the absence of such a process, the system will focus on who is important rather than what is important. Resources will tend to reinforce the status quo rather than move in concerted directions. As noted in the review of these processes, OERI and NCES were treated more like foreign principalities for whom ambassadors were the mode of communication rather than dialogue among members of the same department. The attitudes imbedded in the system in caricature would have one believe on the one hand "OERI does science and the Secretary does politics" or on the other hand "the Secretary grapples with tough policy choices and OERI does research work of minor consequence." Neither, of course, reflected reality, but the mind set degraded institutional performance.

The advent of strategic plans, performance measures and an analytic agenda provide the basis for a much stronger, productive process if the stakeholders have the will to exploit it.

Turning to OERI, there are collections of structural and process issues that impede the achievement of an effective RD&D system. While the 1994 reauthorization and policy direction made some matters better, it has altered other problems not at all or made them worse, particularly in interaction with constrained staff and financial resources.

- As noted in earlier papers, allocation to field initiated work is much improved, and some concrete steps have been taken on quality and standards of evidence.

- The effort or admonition to strengthen basic research has failed, and it would seem unrealistic to try to "repot" work now done elsewhere (e.g., NICHD) into OERI. That does leave open, however, a substantial set of work – basic and applied – to translate the cognitive science into classroom settings.

- Without more staff and financial resources, the institute structure essentially reassembled the resources from one organization into five. Whatever has been gained in conceptual clarity has been lost in "subcritical mass" units and program coherence. Further, the allocation rules continue to concentrate attention on who is doing the work rather than what knowledge is being built. Either resources should be expanded quickly, probably with relaxation of the allocation rules, or the mission narrowed and the institute structure abandoned.

- The role of the regional laboratories should also be revisited, though in a framework that seeks to maximize their comparative advantage to the total knowledge-building enterprise. These labs are in a good position to supply both technical assistance and hands-on applied research. The Board has received presentations on the need for new intermediaries in comprehensive reform efforts which combine applied research and technical assistance to help school districts cope with the complex and interconnected issues in comprehensive reform. The regional labs are ideally situated for such work, and in many cases, are doing it. What is troubling about the regional laboratories is the continuing tendency to load national missions upon regional missions upon local technical assistance without appropriate resources to meet all objectives, which can result in an endless and unproductive series of "projects de jour." The important need to focus and make realistic their missions should capitalize on the inherent strengths of their niche.

- OERI and the Board also need to clarify how to weld national coherence into the stream of individual projects, which has yet to be accomplished and requires a deliberate strategy. This outcome, which is within reach, needs to be predicated on a different philosophy than abhorrence of merit-based political processes and ED leadership. A national knowledge-building agenda in education will surely have content that goes beyond the current Administration's policy crises, a point that seems plausibly understood by all concerned. OERI will need to continue a strong voice in research and evidence-based work of lasting significance. But an effort to build an effective strategy independent of the Department is doomed to failure.

Three other matters of stated concern to the Board need to be addressed in a discussion of structure and process: the conduct of demonstrations; fast turn-around, policy related work and evaluations; and dissemination activities.

- *Demonstrations.* As the second Board background paper makes clear, there are substantial demonstration activities not only in ORAD within OERI but elsewhere in the Department, particularly in the Title I Elementary and Secondary Education program. This scattering of demonstration funding throughout ED is a common occurrence in all domestic departments. The two issues which such practice raises are: (1) whether the demonstrations contain a research or evaluation component; and (2) whether they reflect a sensible and coordinated knowledge-building strategy. ED is making commendable progress toward assuring few, if any, demonstrations without some knowledge-building. ED is doing less well with the second issue, but has an opportunity to improve rapidly through the strategic plan and development of an analytic agenda. Of particular concern in the area of demonstrations is the absence of a federal presence in the comprehensive reform initiatives noted in the September 1997 Board workshop.

- *Policy Short-term Assignments and Evaluation.* Questions are often raised as to how much, if any, very short-term, high policy content work research organizations should undertake and where evaluation work fits in. With respect to the first question, most domestic federal agencies concentrate such work in the Secretary's planning and evaluation shop with some involvement of the analytic offices of the assistant secretaries. Those offices have, as part of their mission, the translation of what we know to what we do. That work is a mixed blessing: important, but potentially all consuming. The axiom holds that short-term policy crises will routinely drive out long term knowledge-building (See Morrill & Weiss, 1997). Accordingly, there is a strong reason to minimize the involvement of research offices in such work. This is not to say that research offices should not contribute their knowledge base to policy deliberations and be fully engaged in planning the knowledge-building agenda.

With respect to evaluation, it should be a full partner in the knowledge-building agenda. The evaluation planning and execution is now under PES management and shared between PES and other assistant secretaries in its execution, depending on project focus and staff capacity. For example, PES and ORAD share the evaluation projects on ORAD demonstrations. The evaluation plans are now well identified in ED strategic plans. This process appears sensible and generally under control.

- *Dissemination*. Table 1 in the paper *The Needs, Demand for and Supply of Educational RD&D* identifies dissemination as 25% of total RD&D 1997 obligations inclusive of NCES and 17% excluding NCES. However, dissemination without NCES as a percentage of total R&D obligations is 54%. There are no easy rules as to what constitutes a proper percentage; however, the first set of percentages do not appear extraordinary, while the relationship to total R&D appear large. We, however, are not now in a position to make an unqualified judgment. Since our definition of dissemination includes technical assistance, we are not troubled with the dispersion of dissemination across various offices. The issue that does raise concern is the modality of the dissemination. Most of the dissemination efforts are keeping up with technology, but the information is often unsorted for quality, and it is usually available passively. The Board's September 1997 workshop starkly raised the issue of the utility of passive information systems in support of comprehensive reform efforts, suggesting proactive technical assistance as a more effective model.

III. Implications for the Congressional Report

This review of the federal role and Departmental structure issues together with earlier papers present substantial problems for potential inclusion in the Board's Congressional report. The authorization legislation in 1994, and what has followed in implementation, has resolved a few problems, but a far larger number remain, some fundamental in nature.

The central matter to which the analysis of the federal role drives us is whether the country and its political leadership believes that it has a serious enough educational problem on its hands to which new knowledge can help contribute to a solution. If so or potentially so, then the kinds of changes in resources, process and structure considered necessary appear plausible. If there is not an important triggering event such as clear recognition of sharp improvement in educational performance as a high national priority, it will be difficult at a minimum to change the status quo. Plausibility will require crafting a sequential strategy, probably around the new money in the OERI budget, to stimulate a series of changes in practice. This strategy would necessarily include: (1) a dramatic demonstration of the problem and the nation's stake in its solution; (2) a step-by-step presentation of where new knowledge is needed and can be acquired; and (3) a clear demonstration of how the research is science-based rather than faddism.

With respect to matters of structure and process, the implication of the analysis for the reports includes:

- Whether the Board wants to advocate an integrated RD&D planning process in which the Departmental leadership and the political process are treated as partners and the source of resources or the enemy?
- Whether the Board wants to take the NRC judgment seriously about matching resources and mission and either get more resources or cut scope and an untenable group of underfunded, understaffed institutes?
- Whether the Board wants to advocate a tighter resource-mission fit for the regional laboratories?
- How the Board wants to deal with the absence of basic research in ED?
- Whether the Board wants to advocate a new form of intermediaries and a different, proactive approach to dissemination?

REFERENCES

1. Hawley, W.D. Enhancing the Federal Government's Capacity to Support the Improvement of Education Through Research and Development, Educational Researcher, May 1990.

2. Mathtech, The Educational Research, Development and Dissemination System, An Analytic Mapping, January 5, 1998.

3. _____, The Needs, Demand For and Supply of Educational Research, Development and Dissemination, February 27, 1998.

4. _____, Comparison of Selected Federal RD&D Styles, March 6, 1998.

5. Morrill, W.A. & Weiss, H.B., Talent, Tensions and Transition, An Organizational Analysis of Planning and Evaluation Service, February 1998.

6. National Academy of Education, Research and the Renewal of Education, 1991.

7. National Research Council, Research and Education Reform, Roles for the Office of Educational Research and Improvement, National Academy Press, 1992.

8. President's Committee of Advisors on Science and Technology, Report to the President on the Use of Technology to Strengthen K-12 Education in the United States, March 1997.

9. Sroufe, G. et al., The Federal Education Research Agency: New Opportunities and New Challenges for Researchers, Educational Researcher, May 1995.

10. Wise, A.E., A Response to America's Reform Agenda: The National Institutes for Educational Improvement, Educational Researcher, May 1990.